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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII — CLEVELAND, OHIO, APRIL 7, 1904 — NUMBER 14

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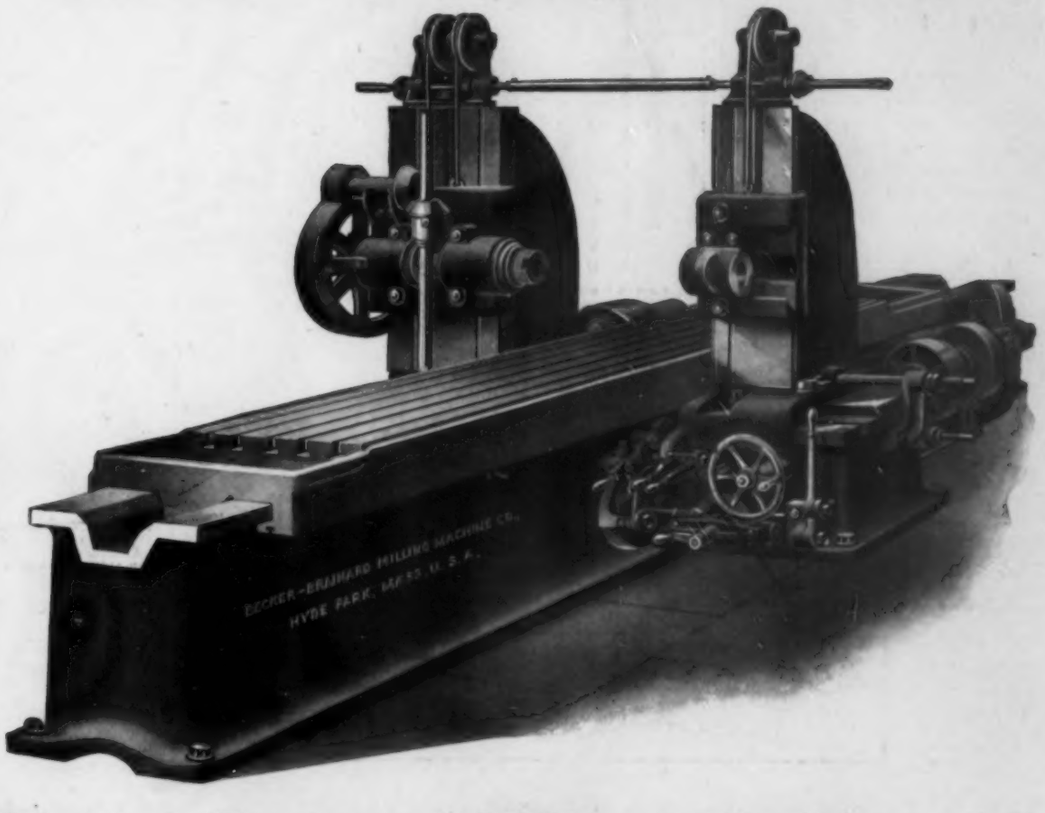

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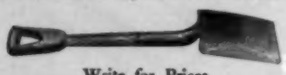

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The Iron Trade Review

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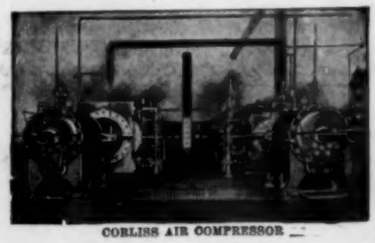

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, APRIL 7, 1904 NUMBER 14

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The uncertainty concerning the exact outcome of the present negotiations between producers of Lake Superior is carried over to next week, the New York meeting having been postponed to April 12. The developments of the past month have not been such as to promise any change in the attitude of the merchant ore firms, and in this connection it is intimated by large producing-consuming interests that if there is no association this year, none need be expected in following years. Meantime further long time ore contracts are under negotiation, which will make the market price of Lake Superior ore from year to year less of a factor in the iron industry than ever.

Pig iron is firm at the moment, but with little promise of an early resumption of the active buying of March. In Bessemer a purchase of 10,000 tons by the Steel Corporation at $13.85 delivered at Cleveland and Lorain, is the feature. This transaction, in connection with the heavy output of all corporation steel works, is thought to point to the taking of the 45,000 tons of iron for May delivery covered by the corporation's option expiring April 10. Steel making pig iron, like foundry iron, is still being consumed in excess of current make. Basic has shown some activity, as has also low phosphorus Bessemer, particularly in the East. Foundry iron markets are quiet and as most buyers are supplied for much if not all of the first half and furnaces have orders taking their product for that period, an interval of comparative quiet is ahead, with little expectation of an immediate change in prices. Figures given in our Cincinnati market report show that about 50 percent of the capacity of Southern coke furnaces is active, also that of foundry buyers in the Central West 78 per cent of those answering a recent circular letter have iron enough bought to carry them to July 1. The remainder expect to buy a little. Few of the idle Southern furnaces, it is estimated, can go in blast on less than $1 a ton advance over the present price of iron. The situation is regarded likely, therefore, to remain at a stand for some weeks so far as prices are concerned. Most producers ask $10 for No. 2 iron at Birmingham, and the $9.75 quotation occasionally heard is minimum. A sale of Southern gray forge and No. 4, 1,000 tons of each, is reported at $9 Birmingham. Increased production of pig iron may be expected in the second quarter, but this will be largely in Bessemer iron through the starting up of new furnaces connected with steel works. Three furnaces in the Pittsburg district started this week; with four additional to start before July 1 this means an increase of 1,000,000 tons a year. The effect of the possible turning of some merchant furnaces to foundry iron is to be considered in this connection.

The firmness of steel billets continues a feature of the market. Export shipments of billets and sheet bars by the Steel Corporation, which exceeded 25,000 tons in February, are expected to show larger in the March statistics, and to be of good proportions in the second quarter. Advances by German and British producers have been followed by higher quotations for American steel—80 shillings at Liverpool, Antwerp or Manchester for billets, which would net Pittsburg mills close to $16.50, as against less than $15 at mill for some of the steel sold abroad in the latter part of 1903. Meetings of the billet, rail, plate and structural steel manufacturers are to be held in New York next week following the ore meeting.

The way in which the steel mills keep their outputs up to capacity practically, with so small a tonnage, relatively, being placed in the heavy lines is still a matter of wonder. The agricultural demand is doing much to fill the railroad breach, and the accumulation of tonnage in bars, light rails, small angles, bolts and nuts, in wire, sheets and pipes, is such as to keep the bookings of some plants ahead of their shipments week by week. Some further car business is under inquiry including two for 1,000 wooden cars each and one for 2,000 steel cars. Prospects for new business in standard section rails are not brilliant.

The rejection of the proposed wage reduction by sheet and tin plate workers brings up the possibility of a strike, but a hastily called convention is now in session at Pittsburg, to which the manufacturers will present their statement of the situation.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, April 6.

Continued strength is shown in pig iron and finished products, and the prevailing opinion is that the situation is assured until July 1. There has been practically no buying of iron for delivery beyond the middle of the year, although the tonnage of finished products for delivery the second half is growing larger every day. Demand for plates and structural shapes is improving, steel car plants and structural shops buying plates more freely, although the shipbuilding trade is still backward.

Within the week the United States Steel Corporation bought an additional 10,000 tons of Bessemer iron for April and May delivery. This deal, as contemplated several weeks ago, provided for 20,000 tons, and as closing was delayed from time to time it was believed that the iron was not required and that the purchase would not be made. Increased demand for iron on the part of the corporation's steel plants made it a necessity. The iron is for Cleveland and Lorain delivery, at $13.85 delivered at either point. For Cleveland delivery the furnace nets $13.70 and for Lorain delivery $13.60. The undelivered tonnage of Bessemer for the month of April due from Valley furnaces was not canceled and will be delivered this month. Several weeks ago the indications were that the tonnage would be quite high, but an improvement in coke shipments helped out materially, with the result that deliveries were only 3,000 to 4,000 tons behind. The taking of this iron, the purchase of additional iron for Lorain and Cleveland delivery and the general stiffening of the Bessemer iron market would indicate that the corporation will exercise its option on May iron. It is expected to take about 45,000 tons. Whether any Bessemer for June delivery will be purchased from Valley furnaces is a question. This week one of the new stacks at Donora was blown in and in a month the second furnace at this plant will be in operation. Two stacks at Sharon and two at Youngstown will be in by July 1, and this increased capacity will readily take care of steel work requirements unless there is a tremendous increase in the demand for steel products generally.

The ore meeting has been postponed until April 12. It is to be held in New York and will be followed by meetings of producers of billets, structural shapes, etc. The plate meeting is scheduled for Thursday of this week. Unless the merchant ore producers consent to act in unison with the other ore interests this year, the larger producers have announced that there is very little likelihood of such an association in the future.

The orders taken by the export department of the United States Steel Corporation for billets, sheet and tin bars are heavier than generally believed by the trade. Orders for these materials for delivery this year aggregate nearly 250,000 tons. Owing to the strengthening of the domestic market and the

higher prices made on these products by the German steel syndicate advances of about 4 shillings have been made by the export company of the Steel Corporation. No orders for billets are now being taken for delivery before June, and for this delivery 80 shillings is asked, delivered Liverpool, Antwerp or Manchester, while sheet and tin bars are held at an advance of one shilling a ton. Less than a month ago billets were sold for delivery at these points at 76 shillings 6d and bars at an advance of one shilling. Considerable business is still being offered and the indications are that a considerable tonnage will be placed in the next few months despite the German competition. Billets at 80 shillings will net the works, Pittsburg, about $16.50, while some of the business taken abroad a few months ago netted the works a trifle under $15 a ton. The Duquesne works of the Carnegie Steel Co. are now running full on billets and bars for foreign shipment, and orders in hand will keep the mill on in full until nearly the middle of the year.

Today the delegates of the sheet and tin plate lodges of the Amalgamated Association are meeting for the purpose of reconsidering the refusal to accept the recent reduction in wages. As noted last week the reduction was rejected by an overwhelming vote. An amicable adjustment is looked for. An analysis of the vote showed a majority of the tin workers employed by the American Sheet & Tin Plate Co. in favor of the reduction, while the almost unanimous votes of the employes of the independent sheet and tin mills caused a rejection of the reduction.

Pig Iron.—The pig iron market continues strong despite the absence of important buying, apart from the Steel Corporation's purchase of 10,000 tons of Bessemer. Foundries are buying in small lots only, but more generally, and a continuous operation of the mills in this district will result in much work for the local foundries whose work depends largely on the rolling mill trade. While there has yet been no direct intimation that the corporation will accept the May iron on which it has an option, it is almost a certainty that this will be done, as all of is steel mills are short of iron. Bessemer for delivery during April, May and June is held at $13.35 at the furnace, while for prompt iron $13.50 is asked. No. 2 foundry is selling at $14, Pittsburg, as the minimum and the general market is from $14 to $14.50. Forge is firm at $13.25 to $13.50, with little buying. Demand for basic is improving and it is quoted at $13.25, Valley furnace. Within the next three months five new steel works blast furnaces will be blown, while two new stacks were blown in this week. These seven new furnaces will have a daily capacity of 3,500 tons and an annual output of a trifle over 1,000,000 tons. In addition one stack that has been undergoing repairs will be blown in shortly, while another stack that has been idle for several months will resume in a week. All of these furnaces will produce iron for steel manufacture and their activity will be at the expense of Valley merchant furnaces unless demand increases materially. We revise quotations as follows:

Bessemer, Valley	$13 35 to 13 50
Bessemer, Pittsburg	14 20 to 14 35
No. 1 Foundry	14 75 to 15 00
No. 2 Foundry	14 00 to 14 50
Gray forge, Pittsburg	13 25 to 13 50
Chilled basic, Valley	13 25 to 13 35
Chilled basic, Pittsburg	14 10 to 14 20

Steel.—Billets and bars for prompt shipment continue scarce and premiums continue to be paid. On a small lot of sheet bars for prompt shipment a premium of $2 a ton was paid this week. Steel Corporation companies are not accepting any business for early deliveries not only for domestic steel but foreign as well. No change in prices is anticipated at the billet meeting to be held next week. Agreed quotations are as follows: Bessemer and open-hearth billets, 4 x 4 inches, and slabs, up to and including 0.25 carbon, $23, Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O., 0.26 and including 0.60 carbon, $1 advance; and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheet and tin bars are $1 per ton extra. Bessemer and open-hearth rods are still quoted at $30 to $31, Pittsburg.

Ferro-Manganese.—Domestic 80 percent is held at $42.50 to $43 in carload lots delivered at buyer's mill at points east of the Mississippi river. Concessions of from 50 cents to $1 a ton would be made on large lots.

Spelter.—The spelter market is firm and higher. Prime Western grades are held at 5.13c to 5.15c delivered. Pittsburg, carload lots.

Muck Bar.—The market is quiet but firm at $26.50 to $72 for neutral bars.

Skelp.—Skelp for prompt shipment is very scarce and certain sizes are commanding slight premiums. Steel skelp is held at 1.45c to 1.50c for grooved and sheared respectively, while grooved iron is held at 1.55c to 1.60c and sheared at 1.60c to 1.65c.

Rails and Track Material.—There has been practically no new business in standard sections, although several roads are reported in the market for small lots. The demand for light rails is improving somewhat, but low prices continue to be made. We make the following quotations: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; 16 to 40 pounds, $23 to $24. Track material: Spikes, 1.65c to 1.70c.

Plates.—Demand for plates is improving. Specifications from steel car works are heavier, while tank manufacturers are buying more freely. The shipbuilding trade is still backward. We make the following quotations: Tank plates, ¼ inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.85c; locomotive firebox, not less than 2.10, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Structural Material.—Demand is improving very materially, the buying being more general, but no large contracts are being closed. Prices are unchanged as follows: Beams and channels, 3 to 15 inches, are quoted, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Bars.—Specifications continue heavy, but there is little new business. All of the mills are operating at their utmost capacity and the market is in good condition. We make the following quotations: Bar iron, 1.40c to 1.45c, Pittsburg, for local delivery, while for Western shipment quotations are based on 1.35c, Pittsburg. Hoops are held at 1.40c base, and bands at 1.35c taking bar extras. Bessemer steel bars, 1.35c; open-hearth, 1.40c; plow beams and cultivator beams, 1.35c, net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.45c. The following differentials are maintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Sheets.—Demand for sheets has improved during the week and there is little shading of prices. The trend of the market in the next few days will depend largely on the action of the special convention called by the Amalgamated Association. Black sheets, one pass, are quoted as follows: No. 8, 1.80c to 1.85c; No. 9, 1.85c to 1.90c; Nos. 12-14, 1.95c; Nos. 15-17, 2c; Nos. 18-21, 2.05c; Nos. 22-24, 2.10c; Nos. 25-26, 2.15c; No. 27, 2.20c; No. 28, 2.30c; No. 29, 2.60c; No. 30, 2.70c. Galvanized: Nos. 12-17, 2.40c; Nos. 18-21, 2.55c; Nos. 22-24, 2.70c; Nos. 25-26, 2.90c; No. 27, 3.10c; No. 28, 3.30c; No. 29, 3.70c; No. 30, 4.10c.

Wire and Wire Nails.—Demand for wire products and nails continues strong, although no advance in prices is looked for at the present time. On cut nails another slight advance would not surprise the trade. We quote: Wire nails, carload lots to jobbers, f. o. b. cars Pittsburg, $1.90 base, plain wire, carload lots, $1.80 base; barb wire, carload lots, $2.20 base; staples, carload lots, $2.05 keg. Galvanized, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel and iron cut nails, carload lots, $1.75, and less than carload lots, $1.80, f. o. b. Pittsburg, plus freight to point of destination. Terms, 60 days, less 2 percent off in 10 days.

Merchant Steel.—A continued improvement is noted for all grades of merchant steel and the mills are operating

more fully than at any time in the past six months. We quote: Cold rolled and ground shafting 52 off in carload lots and 47 percent off in less than carload lots. Tire steel, 1.50c, base; spring steel, 1.90c to 2c; toe calk, 1.85c, base. Tool steel is quoted 6 cents and upwards, according to the grade.

Pipes and Tubes.—Orders placed for pipes and tubes during the first quarter of the year are exceedingly satisfactory and the buying thus far this month is equal to that of the first week in March. Very few concessions are being made by independent mills and the market generally is in good condition. Discounts to consumers, carload lots f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼, ⅜ inch	68	58	66	56
½ inch	71	61	69	59
¾ to 6 inch	75	65	73	63
7 to 12 inch	71	61	68	58
Ex. Stg., plain ends, ⅛ to 8 in.	67	57	64	54
Double Ex. Stg., pl. ends, ½ to 8 in.	59	49	56	46

BOILER TUBES.

	Steel.	Iron
1 to 1½ inch	42½	39
1¾ to 2¼ inch	55½	38
2½ inch	58	43
2¾ to 5 inch	64½	50½
6 to 13 inch	55½	38

Old Material.—Heavy melting stock still continues in good demand and at high prices. We note the sale of several small lots at $14.50, gross ton, Pittsburg. Low phosphorus stock is held at $17 to $17.50, while some mills and dealers are holding out for still higher prices. Cast scrap is held at $13 to $13.25, gross ton, rerolling rails $15 to $15.25 and bushcling scrap $10.50 to $11.

Coke.—Demand for foundry coke has been quite heavy in the past week, the buying being more general than for several months. In addition deliveries are becoming better, due to the better car service afforded the shippers in the Connellsville region. One order for about 15,000 tons of 72-hour foundry coke for delivery to next April was placed at $2, which is considered an excellent purchase under present conditions. The range of prices on foundry coke for delivery the next three to six months is still wide, some producers quoting as low as $2.15 for excellent product, while others are securing as high as $2.50. Furnace coke is being offered more freely and prices range from $1.60 to $1.65. During the week ending Saturday, March 26, the production of the upper Connellsville region reached 202,172 tons and the lower region's output amounted to 50,136 tons, a slight falling off as compared with the production the previous week.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, April 5.

A quiet but firm market fully describes local conditions in the iron and steel trade. There is probably a better tone to some products, while others are slightly weaker; but in a general way, the market retains the main characteristics of a week ago. The most noteworthy feature of trading in the West is the splendid volume of specifications received for the lighter forms of finished material from the agricultural trade. Manufacturers of pipe, wire products, agricultural shapes, bar iron and steel, light black and galvanized sheets, all report that their customers are taking material very freely and that their mills have well-filled order books for the next 90 days. On the other hand, business is light in plates, rails and structural steel. As railroads are the principal consumers of the latter, producers take some comfort from the fact that the carriers are buying cars with more freedom than a few months ago and that necessarily they will soon be compelled to open up communications with mills. In addition to the 3,125 steel cars placed, as noted last week, by the Pennsylvania road and the P. & L. E., the Canadian Pacific has placed 1,000 cars with its own shops; while the Seaboard Air Line has specifications out for 1,000 box cars; the Wheeling & Lake Erie, 2,000 steel cars, the Vandalia 200 cars, and other roads for smaller lots. Sheets are firmer because of the possibility of a strike resulting from the refusal of the Amalgamated Association of Iron and Steel Workers to accede to a cut in wages, though the prices adopted by the independent sheet manufacturers are still being shaded in this market. The scarcity of sheet bars and billets is another factor that has aided in stiffening prices in the finished product. Southern pig iron is generally sold at $10, Birmingham, for No. 2 and local iron at $14 at furnace. The transactions of the past week, while not large in the aggregate, include several orders of good sized proportions. Coke is scarce and standard Connellsville grades are firm at $4.90 to $5 Chicago, with some dealers asking $5.15. Scrap is lower than a week ago, the heavy offerings of railroads and country dealers, amounting to about 7,500 tons in the past week, having reduced prices on some grades.

Pig Iron.—Since the $10 Birmingham schedule was adopted by Southern furnaces, the disposition shown by foundrymen to withhold their contracts in order to test the solidity and strength of the market, has found its counterpart in the indifferent attitude of sellers in the matter of closing up sales. Neither side appears anxious to push the question to any conclusion, but each is very closely watching contributing causes and awaiting developments. Both buyers and sellers, each side fearing the market may move in the direction opposite to its interests, are inclined to handle the situation with kid gloves. The Southern furnaces are standing to their $10 Birmingham schedule with considerable firmness, and there is even a feeling on the part of some that higher prices will rule before the month is closed. Northern producers are equally sanguine over the outlook, and $14, Chicago, is the minimum at which local No. 2 foundry can be bought, with one producer asking $14 at the furnace for its product, which means $14.35, Chicago. The transactions in the past week included an order for 3,500 tons from a large agricultural implement interest in Ohio, which was divided among several Southern producers at $10, Birmingham, for deliveries extending over six months. A Michigan stove works also bought 1,000 tons of Northern iron in addition to a large tonnage from Southern interests during the week. The bulk of the transactions, however, ranged from carlots to 500 tons. Gray forge iron is very scarce and firm, $8.75, Birmingham, being the minimum price at which it has been offered in this market in the past week. Our quotations follow:

Lake Superior Charcoal	$15 00 to 15 50
Northern Coke Foundry No. 1	14 25 to 14 50
Northern Coke Foundry No. 2	14 00 to 14 25
Northern Coke Foundry No. 3	13 50 to 14 00
Northern Scotch Foundry No. 1	14 50 to 14 75
Ohio Strong Softeners No. 1	15 30 to 15 80
Ohio Strong Softeners No. 2	14 80 to 15 30
Southern Coke Foundry No. 1	14 35
Southern Coke Foundry No. 2	13 85
Southern Coke Foundry No. 3	13 35
Southern Coke Foundry No. 4	12 85
Southern No. 1 Soft	14 35
Southern No. 2 Soft	13 85
Southern Gray Forge	12 60 to 12 85
Southern Mottled	12 35 to 12 60
Southern Silveries (4% to 6% Silicon)	14 85 to 15 35
Jackson Co. Silveries (8% to 10% Silicon)	17 80 to 18 30
Alabama and Georgia Car Wheel	18 85 to 19 00
Malleable Bessemer	14 00 to 14 50
Basic Iron	13 85 to 14 35

Billets.—There is little demand for either Bessemer or open-hearth billets in this market. It is reported that association prices have been shaded on recent sales, one producer who bid 25 cents a ton under the official schedule on a lot of 1,000 tons failing to get the order at this figure. We continue to quote Bessemer and open-hearth billets, 4 x 4 and larger, up to .25 carbon, $24; up to and including .60 carbon, $1 extra; over .60 carbon, $2 extra. Axle and forging billets, smaller than 4 x 4, $25 Chicago. Open-hearth billets from store, $1.30 per 100 lb.

Iron and Steel Bars.—The market has no features of unusual interest. New business is of small proportions, though specifications continue to be exceptionally heavy. The outlook is bright, inquiries of late coming with more freedom from railroads and car builders. All the mills are well filled with orders, most of them having specifications on hand that will run them for some months.

We continue to quote on carload lots, mill shipments, Chicago delivery: Bar iron, 1.45c to 1.50c half extras; soft steel bars, 1.51½c half extras, with 5c to 10c per 100 pounds extra for less than a carload lot and with the regular extras for less than a ton of a size; angles, less than 3 x 3, 1.56½c base, half extras; hoops, 1.56½c full extras. On lots from store, we quote iron, 1.65c; steel, 1.75c base; hoops, 2.10c rates.

Sheets.—While prices lower than the schedule adopted by most of the independent producers are being made to consumers in this territory, the market is stronger than it has been for some time. This is largely attributed to the scarcity of billets and sheet bars, for which some Eastern mills are said to be asking premiums on prompt shipments; and also to the fact that the various lodges of the Amalgamated Association of Iron and Steel Workers voted against the proposition to accept a reduction in wages. The demand during the past week for both black and galvanized sheets was quite brisk, and included several good sized lots. The following prices, which are about $1 a ton lower than the independents' schedule, are being made by some outside mills on one pass, cold rolled sheets, carload lots, Chicago delivery: Nos. 16 and 17, 2.10c to 2.15c; Nos. 18 and 21, 2.15c to 2.20c; Nos. 22 and 24, 2.20c to 2.25c; Nos. 25 and 26, 2.25c to 2.30c; No. 27, 2.30c to 2.35c; No. 28, 2.40c to 2.45c; No. 29, 2.70c to 2.80c; No 30, 2.80c to 2.90c, with the usual extras for quantities and sizes. Galvanized sheets, mill shipments, No. 27, 3.26½c; No. 28, 3.46½c. On small lots from store, we quote black sheets as follows: Nos. 8 and 10, 2.15c to 2.20c; No. 12, 2.20c to 2.25c; No. 14, 2.30c to 2.35c; No. 16, 2.40c to 2.45c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.65c to 2.70c; No. 27, 2.75c to 2.80c; No. 28, 2.80c to 2.85c; No. 29, 2.95c to 3c; No. 30, 3.10c to 3.25c. Galvanized, 75 and 7½ percent.

Structural Steel.—Warehouses and structural yards report there is a brisk demand for light shapes in small lots. A large amount of small building is being done in this city and contiguous territory which takes up in the aggregate a considerable tonnage of material. Mill business is light and specifications are coming in slowly. Prices are unchanged, and we quote carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.76½c; angles, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 2c; 18, 20 and 24-inch, 10c extra; tees, 2.05c rates.

Plates.—In the last three or four weeks, some of the independent mills have been cutting prices on very favorable specifications for immediate shipment only. These mills seem to have taken enough business to satisfy them for the present, and, as a consequence, have restored prices to the Association basis. We quote carload lots, mill shipments, Chicago delivery: Tank steel, ¼ inch and heavier, 1.76½c; flange steel, 1.86½c; marine 1.96½c; universal mill plate, 1.76½c to 1.81½c; 3-16 inch tank, 1.86½c; Nos. 7 and 8, 1.91½c; No. 9, 2.01½c; No. 10, 1.91½c; No. 11, 1.96½c; No. 12, 2.01½c. From store, we quote tank steel, ¼ inch and heavier, 2c; 3-16, 2.15c; No. 8, 2.20c; No. 10, 2.25c; flange steel, 2.35c, all f. o. b. warehouse.

Rails and Track Supplies.—There is a good inquiry for standard sections from electrical and interurban roads, but steam roads are not large factors at the present time. Specifications are received by the local mill in ample proportions, however, and it has no lack of business. Orders for light rails, while not as heavy as in February, were taken at better prices in the month just closed. Track supplies are in good demand, railroads asking for full quotas on their contracts. Prices are unchanged, and we quote heavy rails, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; 25-pound rails, $25 to $26; 12-pound rails, $26 to $28, with regular differentials for intermediate sizes. The following quotations on track supplies, which are f. o. b. Joliet mill, may be shaded on large orders: Angle bars, 1.40c to 1.50c; spikes, first quality, 1.70c to 1.80c (out of store, 1.90c rates); track bolts, 3½ x ¾, with square nuts, 2.40c to 2.50c per 100 pounds; with hexagon nuts, 2.55c to 2.65c, with usual differentials for other sizes.

Merchant Steel.—Further implement contracts are reported by mills, some consumers covering for their requirements until June, 1905. Specifications are in good volume, and the outlook is very promising. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2c; sleigh shoe, flat sizes, 1.56½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.76½c base; smooth finished tire, 1.71½c; plow steel, 2.30c and upwards, according to quality; toe calk, 2.06½c base. Ordinary grades of crucible tool steel, 6½c to 8c; special tool steel, 12c and up. Cold rolled shafting, 52 percent from list in carload lots, and 47 percent discount in less than car lots.

Cast Iron Pipe.—There has been a good demand for cast iron pipe during the week, but almost entirely in small lots. Leading producers deny the report that St. Louis is in the market for 100,000 tons of pipe. The municipality itself is only figuring on 1,000 tons and has not yet placed its order. The report is generally credited to the purchase of the Laclede Gas Co., of St. Louis, which about two months ago, placed an order with the Dimmick Pipe Co., Birmingham, Ala., for 9,200 tons of gas pipe, for which specifications have recently been sent in. Prices are firm, and we quote carload lots, Chicago delivery: 4-inch water pipe, $26; 6-inch to 12-inch, $25; larger sizes, $24; gas pipe, $1 a ton higher.

Merchant Pipe.—There is nothing to report except the usual week's supply of specifications, which continue of very large proportions. Prices are without change, and we quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guar. Wrought Iron. Black. Percent.	Guar. Wrought Iron. Galv. Percent.
⅛ to ⅜ inch	66.35	56.35	64.35	54.35
½ inch	69.35	59.35	67.35	57.35
¾ to 6 inches	73.35	63.35	71.35	61.35
7 to 12 inches	69.35	59.35	66.35	56.35

Less than carloads, 12½ per cent. advance.

Boiler Tubes.—The demand has improved somewhat but is still far from being satisfactory. We continue to quote mill shipments, Chicago delivery, as follows:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	43.35	40.85	53.35
1¾ to 2¼ inch	55.85	38.35	40.35
2½ inch	58.35	43.35	40.35
2¾ inch to 5 inch	64.35	50.85	Up to 4 inches.
6 to 13 inch	55.85	38.35	48.35

For car lots or less, direct from warehouse stock:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	40	35	37.50
1¾ to 2½ inch	50	32.50	35
2¾ to 5 inch	60	45	Up to 4 inches.
6 to 13 inch	50	32.50	45

Wire Products.—The leading interest states there is no diminution in the exceptionally heavy demand that has been felt all spring for its entire line of products. It is noteworthy that the manufacturing trade is particularly brisk, many concerns anticipating specifications on their contracts and not a few placing supplementary orders. Prices are without change and we quote carload lots to jobbers, Chicago delivery, as follows: Wire nails, carload lots, $2.10; less than carload lots, $2.15; cut nails, carload lots, 1.86½c base; less than carload lots, 1.19½c; smooth wire, carloads, $2, and $2.05 for less than carload lots; galvanized smooth wire, $2.30 in carloads, and $2.35 in lesser amounts; painted barbed wire, $2.40 carloads, and $2.45 in less than carload lots; galvanized barbed wire, $2.70 carloads, and $2.75 less than carload lots. Staples, polished, carloads, $2.25; less than carload lots, $2.30; galvanized, $2.55 carloads, and $2.60 less than carload lots. Bale ties, 82½ and 5 percent discount, f. o. b.

Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—The local market is far from being a satisfactory one either to consumers or dealers. Shipments from the East are not only diminished in quantity, but belated in transit and Western melters are suffering considerable hardship from the scarcity. Prices of Connellsville grades have stiffened as a result of the shortage, and selected 72-hour foundry coke is firm at $2.25 to $2.35 at the ovens, some dealers asking $2.50. Virginia and West Virginia grades range from $2 to $2.25 at the ovens, and Milwaukee Solvay, in limited quantities, is offered at $5 Chicago.

Old Material.—Several round tonnages of scrap have been disposed of in this market during the past week by the C. M. & St. P., C. R. I. & P., St. L. & S. F. and the Burlington road, aggregating in the neighborhood of 7,500 tons, including 2,500 car wheels. The free offerings by country dealers who have been compelled to unload some of their stocks in addition to the sales made by railroads, with no corresponding increase in demand or consumption, has weakened prices, and several products are down from 25 cents to 50 cents a ton. Mills and foundries are buying little material just at present, and it is not unlikely that prices will go yet lower in the near future. We have revised those quotations affected by the change, and quote dealers' selling prices, gross tons, as follows:

Old iron rails	$16 50 to 17 00
Old steel rails (mixed lengths)	11 25 to 11 75
Old steel rails (long lengths)	13 00 to 13 50
Relaying rails	23 00 to 24 00
Old wheels	13 50 to 14 00
Heavy melting steel	11 25 to 11 75
Mixed country steel	9 50 to 10 00

The following are selling prices for net tons:

Low phosphorus scrap (.04 and under)	$13 00 to 14 00
No. 1 R. R. wrought	12 50 to 13 00
No. 2 R. R. wrought	11 50 to 12 00
Shafting	13 50 to 14 00
Dealers' forge No. 1	9 75 to 10 25
No. 1 cast	11 50 to 12 00
No. 1 busheling and wrought pipe	9 00 to 9 50
Heavy cast (300 pounds and over)	8 50 to 9 25
Agricultural malleable	9 00 to 9 50
Iron axles	16 50 to 17 00
Steel axles	15 00 to 16 00
No. 1 boilers, cut	8 50 to 9 00
Cast borings	4 75 to 5 25
Mixed borings, etc.	4 75 to 5 25
Wrought turnings	7 25 to 7 75
Machine shop turnings	7 25 to 7 75
Iron axle turnings	8 25 to 8 75
Steel axle turnings	8 25 to 8 75
Stove plate and light cast scrap	9 50 to 10 00
Old iron splice bars	13 00 to 13 50

The Fort Wayne Iron & Steel Co., Fort Wayne, Ind., has opened a sales and purchasing department at 407 Temple building, Chicago. The sales department at Chicago is in charge of P. H. Joyce and the purchasing department in charge of L. Burnstein.

CLEVELAND.

OFFICE OF *The Iron Trade Review*, 1064 ROSE BUILDING, April 5.

Iron Ore.—The New York meeting of representatives of Lake Superior iron ore interests has again been postponed, the date now being April 12. Owing to the vigorous opposition of the United States Steel Corporation to any plan which would compel it to go into the market and purchase ore, a proposition may be made that if what has been considered to be the corporation's share of the total amount to be mined shall not prove adequate to meet the requirements of the corporation's stacks, it shall be permitted to mine an additional amount. For the corporation to make conversion deals with merchant furnaces would naturally not be regarded with any satisfaction by the merchant ore companies. There is still grave doubt of an agreement being reached. It is understood that a number of long-time contracts are under negotiation.

Conferences between dock managers and representatives of the longshoremen's union are still in progress. Some troublesome questions relating to the management of the docks have been satisfactorily adjusted. It is expected that the men will accept a slight reduction in wages without change of hours. Not one of the large vessel interests has yet hired any employes and few arrangements of any kind for the opening of navigation have been made.

Pig Iron.—The market is firm, sales of fair volume are being made, and there are some very encouraging indications of a continuation of satisfactory conditions. In some cases foundries are finding that their contracts were not made for enough iron to meet present requirements and they are buying spot iron. This applies particularly to manufacturers of agricultural implements, who find that the farmers are prosperous and are buying liberally. The jobbing foundry is not so busy. In the local market, Cleveland furnaces are delivering No. 2 foundry at $13.50 to $13.75. The Valley price for No. 2 foundry is $13, with possibly an occasional sale slightly higher. There is a fair demand for basic at $13.25. The Struthers Furnace Co.'s stack at Struthers, O., which makes basic, was blown in this week after being out of blast four months and being relined. The Hubbard stack which has been making foundry iron was blown out this week to be relined. The other Hubbard stack is running on Bessemer There is little demand for charcoal iron. The makers complain of an increasing tendency to use coke iron with scrap in manufacturing car wheels and say that this fact partly accounts for the dullness of the charcoal iron market. Very little is being done in Southern iron at present prices, which are $10, Birmingham, for No. 2 of some brands and $9.75 for other brands. We quote as follows for Cleveland delivery, save on Northern gray forge, which is at Valley furnace:

Bessemer	$14 25 to 14 35
No. 1 Strong Foundry	14 10 to 14 25
No. 2 Strong Foundry	13 85 to 14 00
No. 3 Foundry	12 40 to 12 75
No. 2 Southern	13 60 to 13 85
Gray Forge, Valley furnace	12 25 to 12 75
Gray Forge, Southern	12 25 to 12 60
Lake Superior charcoal	14 75 to 15 00

Finished Material.—Plates and structural material, which have been exremely dull, show some signs of improvement. If this continues and demand for other lines does not slacken, business for all kinds of finished material, with the possible exception of sheets, will be very satisfactory. The price of 1.35c, Pittsburg, or 1.44½c, Cleveland, for bar iron is being maintained with a fair demand, while steel bars at 1.35c for Bessemer and 1.40c for open hearth, Pittsburg, are selling very well indeed, considering the contracts made before the advance in price of Bessemer was officially announced. There is no change in the sheet situation, but much interest is felt in the settlement of the controversy concerning wages of employes of the sheet mills. Prices of the principal producer through jobbers are as follows: Mill sales of black sheets, No. 10, 1.75c; No. 11-12, 1.80c; No. 14, 1.85c; No. 16, 1.95c; No. 27, 2.20c; No. 28, 2.30c. Galvanized, 80, and 3 off. Out of stock prices are as follows: No. 10, 2.10c; No. 12, 2.15c; No. 14, 2.20c; No. 16, 2.30c; No. 18-20, 2.40c; No. 24, 2.45c; No. 25-26, 2.50c; No. 27, 2.55c; No. 28, 2.65c; No. 30, 3.10c. Galvanized out of stock, 75, 10 and 5 off.

Old Material.—The market is strong and scrap is scarce. Railroads are offering very little. There has been no change in prices. We quote as follows for gross tons, Cleveland:

Old iron rails	$19 50 to 20 00
Old steel rails (over 6 feet)	14 00 to 14 50
Old steel rails (6 feet and under)	13 50 to 14 00
Old car wheels	13 00 to 14 00
Steel boiler plates	10 00 to 11 00
Malleable iron (railroad)	12 50 to 13 00
Malleable iron (agricultural)	10 00 to 10 50
Heavy steel	14 00 to 14 50

We quote the following net tons:

No. 1 R. R. Wrought	$14 00 to 15 00
No. 1 busheling	11 50 to 12 00
No. 1 machine cast scrap	11 50 to 12 00
Iron axles	16 50 to 17 50
Axle turnings	9 00 to 10 00
Wrought turnings (free from cast)	8 25 to 8 50
Uncut wrought iron boilers	5 00 to 6 00
Grate bars	9 00 to 10 00
Pipes and flues (clean)	10 50 to 11 50
Tank iron	9 50 to 10 50
Hoop and band iron	5 00 to 6 00
Sheet iron	4 00 to 5 00

Wrought drillings	7 00 to 8 00
Stove Plate	9 50 to 10 50
Steel axles	14 00 to 15 00
Cast borings	5 50 to 6 00

CINCINNATI.

April 5.

The coke market is quiet and easy in tone, brought about by an easier car situation in the Connellsville district. Foundry coke is selling at a range of from $2 to $2.25 f. o. b. ovens.

Pig Iron.—The market presents practically no new features this week excepting that business is more quiet and there is less inquiry. Melters of foundry irons are reported to be taking all of the iron due them on their contracts and in some instances are urging more prompt shipment. The local foundries are reported to be somewhat busier. It is interesting to note that pig iron commission houses are endeavoring to ascertain as near as possible the exact condition of affairs in regard to probable requirements for foundry iron to July 1. One of the houses has made a systematic investigation through its traveling salesmen, and by direct inquiry to melters of foundry iron in the territory for which Cincinnati would be the proper distributing point. The results of that investigation lead to the conclusion that 78 percent of the melters of foundry iron will not need to buy for delivery prior to July 1. Twenty percent will require a little and 2 percent report none bought for delivery after July 1. The territory covered by this investigation includes Ohio, one-half of Michigan, two-thirds of Indiana and the greater part of Kentucky.

Another representative of Southern furnace interests has recently made a trip through the pig iron producing territory in the South, excepting West Tennessee. The results of this investigation show that in Sheffield and Florence, Ala., two furnaces are in blast and four out. In the Birmingham district, eighteen are in and seven out. In the Chattanooga district four are in and five out. Anniston, Ala., has none in and four out. Gadsden, Ala., has two in and one out. In the Virginias, seven are in and ten out. Tuscaloosa, Ala., has one in and none out. The above refers to coke furnaces only. The same authority estimates from his investigations that the Southern furnace production of pig iron at present is about 50 percent of the maximum capacity. The results of these two investigations seem to make fairly clear the situation in regard to production and the probable requirements for foundry iron in the next three months. It would seem that present consumption and production, so far as Southern irons are concerned, would closely balance. It is believed in the trade that the market will have to advance at least another dollar per ton before increased Southern furnace production can be expected. The present level of values is about the same as a week ago, $9.75, Birmingham, for No. 2 foundry, being the minimum, with $10, Birmingham, for No. 2 foundry the general asking price. A transaction is reported involving 1,000 tons of gray forge and 1,000 tons of No. 4 foundry at a flat price of $9, Birmingham. There is some inquiry for quotations covering deliveries in the third quarter, but furnace interests seem reluctant to quote beyond July 1. Ohio irons are still quoted at $12.50 to $13 furnace. Current prices f. o. b. Cincinnati are:

Southern Foundry No. 1	$13 00 to 13 25
Southern Foundry No. 2	12 50 to 12 75
Southern Foundry No. 3	12 00 to 12 25
Southern Foundry No. 4	11 50 to 11 75
Southern Foundry No. 1 soft	13 00 to 13 25
Southern Foundry No. 2 soft	12 50 to 12 75
Gray forge	11 25 to 11 50
Northern Foundry No. 1	14 15 to 14 65
Northern Foundry No. 2	13 65 to 14 15
Northern Silvery (8% silicon)	16 15 to 16 65
Southern car wheel iron	16 75 to 17 00

Finished Material.—The demand continues active and jobbers report quite satisfactory business. An inquiry from a car builder has come into the market for 5,000 tons of bar iron for deliveries to July 1. It is understood that the contract is not bringing out sharp competition, and one of the leading bar makers is said to have quoted on basis of 1.55c f. o. b. Jeffersonville, Ind. Bar iron is quoted at 1.45c f. o. b. Steel bars are advanced to 1.48c base, half extras, with dealers quoting 1.75c to 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 to 75, 5 and 2½ percent off. We quote black sheets, No. 27, at 2.45c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.80c; No. 27, 2.70c; No. 16, 2.45c; No. 14, 2.35c; No. 12, 2.30c; No. 10, 2.25c. Tank plates are dull and sell out of store at 2c for ¼-inch and 2.10c for 3-16 inch. Beams and channels are quoted at 1.90c to 2c from stock, and angles at 1.90c to 2c for base sizes.

Merchant Pipe.—The market continues quiet, with no special features to be noticed. Quotations are unchanged and dealers expect more liberal specifications on contracts with the advent of spring weather conditions. We quote for car load lots, f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	66.7	56.7	64.7	54.7
½ inch	69.7	59.7	67.7	57.7
¾ to 6 inch, inclusive	73.7	63.7	71.7	61.7
7 to 12 inch, inclusive	69.7	59.7	66.7	56.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	37.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—The situation is unchanged. Buyers and sellers are rather slow to trade. Scrap dealers are asking firm prices, but in their bids for material are conservative. Railroads and other sellers of scrap are not offering freely. We quote:

Old No. 1 railroad wrought, net tons	$11 50 to 12 00
Cast machine and foundry, net tons	11 00 to 11 50
Old iron rails, gross tons	16 00 to 16 50
Old steel rails, gross tons	12 50 to 13 00
Old short lengths, gross tons	11 00 to 12 00
Old iron axles, net tons	15 50 to 16 50
Stove plate, net tons	9 50 to 10 50
Wrought turnings, net tons	7 50 to 8 00
Cast borings, net tons	4 50 to 5 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., April 5.

Pig Iron.—Underlying conditions in the pig iron market during the week were not as strong as those which existed the week prior. There has been no change in prices, but at this writing the belief that lower values will prevail finds many supporters. Southern sellers are very much pleased that recent schedules have been maintained, but it has been at the expense of diminished business. For Southern No. 2 foundry $10, Birmingham, is still the controlling price, but consumers are never found in the market unless pressing needs force them. Users of Southern brands believe that lower prices are inevitable. In fact, some of them are surprised that they have not appeared before this, since there are so many reports that $9.75 for No. 2 foundry is being done elsewhere. During the week a number of consumers had "feelers" in the market, but makers were unwilling to make any concessions. One inquiry for 3,000 tons went through this experience. All Southern sales agents report decreased sales for the week, and little risk is taken in stating that recent advances have been responsible for it. In Northern iron sales for the week under review have been heavy, especially to steel makers. Prices have been firm, and the consensus of opinion is that they are likely to remain so. The contracts for the Pennsylvania castings have not been placed up to this writing, but there are reports that they will be given out in a week at the latest. Considerable is heard about foundries having been urged to lower their prices, but this cannot be verified either. New York prices on pig iron are as follows: Northern No. 1 X, $15.50 to 15.95; No. 2 X, $14.75 to $15.20; No. 2 plain, $14.50 to $14.95; Southern No. 1 foundry, $14 to $14.25; No. 2 foundry, $13.25 to $13.75; No. 3 foundry, $12.75 to $13.25; No. 4 foundry, $12.25 to 12.75.

Finished Iron and Steel.—In structural shapes no con-

tracts of any magnitude have been placed, although small bookings aggregating an excellent tonnage have been a feature. Structural material men still complain of the indifference shown to closing, and in this connection state that the disturbed condition of the building industry in this city has been a potent factor. There continues to be a fair run of orders for plates, but several large propositions in which the trade has been vitally interested are slow in materializing into orders. Bars show a fair degree of activity, although the talk of higher prices has not been so common as the week preceding. Sheets are without interest. Jobbers are taking a fair amount of business, but the building strike here is depriving them of many orders. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; firebox, ordinary, 1.94½c to 2c; refined iron bars, 1.50c to 1.55c; soft steel bars, 1.50c to 1.55c; steel sheets, in carloads, New York, No. 28 black, 2.45c to 2.50c; galvanized, 3.50c to 3.55c.

PHILADELPHIA.

April 5.

The market is strong and the demand active. With the orders already placed, it is assured that blast furnaces and mills will be busy during the second quarter of the year. The demand during the last half will depend to a large extent on crops and on labor conditions.

Pig Iron.—The tone of the market is excellent. Prices show little change, although an advance is being paid for prompt deliveries. Southern is quoted at $10 for No. 2, Birmingham, or $14.50, Philadelphia. There has been much delay in making shipments from the South and most buyers prefer Northern irons, which command about 50 cents more than Southern. Basic and mill irons are scarcer than any foundry grades. Furnaces are making large outputs and it is expected that all demands will be met with reasonable promptness. A considerable tonnage of Canadian iron has been purchased by pipe foundries. We quote as follows:

No. 2 X foundry, $15.00 to $15.25; No. 2 plain, $14.50 to $14.75; gray forge, $13.75 to $14.00; basic, $14.00 to $14.25. Southern brands: No. 2 X foundry rail deliveries, $14.25 to $14.50; No. 2 X foundry on dock, $13.50 to $13.75.

Steel.—There is good demand. The mills at Chester and Wilmington are not in operation and other plants are kept busy. Prices are firm and indications are for higher quotations.

Finished Material.—Plates and structural material are still dull, but there is a strong demand for bars. Demands of labor unions are causing trouble. Ship yards and car shops are short on orders. We quote: Bar iron or bar steel, 1.48½ to 1.55; beams, channels and tees, 1.73½ to 1.85, according to the specifications; small angles, 1.55 to 1.60.

Old Material.—Old rails are wanted, but buyers consider prices too high. The same is true of other kinds of scrap and, while the market is strong, transactions are not numerous, or buyers are waiting for lower prices. We quote:

Low phosphorus scrap, $18.00 to $19.00; old iron rails, $17.50 to $18.00; old iron axles, $20.50 to $21.50; old steel rails, $14.50 to $15.50; old steel axles, $18.00 to $19.00; old car wheels, $13.50 to $14.00; heavy melting steel, $14.00 to $14.50; country scrap, $15.50 to $16.50; wrought iron pipe, $12.50 to $13.25; No. 1 wrought railroad scrap, $17.50 to $18.50; No. 1 wrought yard scrap, $13.00 to $13.50; machinery cast, $13.00 to $13.50; stove plate, $12.00 to $12.50; wrought turnings, $9.50 to $10.00; cast borings, $7.00 to $7.50.

The wire nail department of the Rankin, Pa., plant of the American Steel & Wire Co. was destroyed by fire this week. The loss is about $125,000. This department contained 210 nail-making machines and only a few can be saved from the wreckage. The warehouse containing about 26,000 kegs of nails was not damaged, contrary reports notwithstanding.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909 NO. 150 NASSAU ST., April 5.

Pig Tin.—With the Easter holidays closing the London market for several days, interest has been chiefly centered in the local situation, which has been marked by higher prices, and a bullish feeling, the demand from consumers having shown a little more animation. The March statistics, compiled by Secretary Mayer of the Metal Exchange, and which are regarded as favorable, show the total visible supply to be 15,662 tons, against 16,450 tons for February, 1904, and 19,497 tons for February, 1903. Deliveries were 3,600 tons, with arrivals 3,991 tons, and 2,879 tons afloat. Local stocks amount to 1,202 tons. The London market was active, and prices are about as we last quoted. Today's closings at the Metal Exchange follow: Spot, 28½c to 29c; April, 28¼c to 28¾c; May, 28¼c to 28½c. London's closings today follow: Spot, £128 12s 6d; futures, £128 15s.

Copper.—The "official" prices were advanced ¼c during the week, because of the continued heavy exports. Demand from home sources has been considerably larger also, and at this writing the trade situation is stronger than we have been able to note in several months. The exports for March were 22,625 tons, and the total exports for the first three months were 68,833 tons, against 32,354 tons for the same period last year. London during the week was very strong, and prices scored substantial advances. Today's closings at the Metal Exchange follow: Lake, 13c to 13¼c; electrolytic, 13c to 13⅛c; casting, 12¾c to 13c. London's closings today follow: Spot, £58 15s; futures, £58 12s 6d.

Lead.—Is firm and unchanged at 4.60c to 4.65c. St. Louis is steady at 4.42½c to 4.45c. London is lower at £12 3s 9d.

Spelter.—Is active and higher at 5.25c to 5.30c. St. Louis advanced to 4.95c. London is stronger at £22 2s 6d.

Antimony.—Prices are unchanged, Cookson's being 7¾c to 8c; Hallet's, 7¼c to 7½c, and other grades, 6¼c to 6½c.

Quicksilver.—We quote $46 per flask of 76½ pounds in lots of 100 flasks. London is £8 5s.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, April 5.

There is little of interest to report regarding the local metal market, buying being of a light order. The recent advance in the price of both spelter and sheet zinc has been well sustained and the new prices are held firm. Copper is unchanged and pig tin is also holding well at the new prices. We quote Lake, 13c to 13¼c for carload lots, and 13⅜c to 13¾c for less than carload lots; castings, carloads, 12¾c to 13c; for lesser lots, 13¼c to 13½c. Pig lead, 4.45c in carload lots, and 4.50c to 4.55c in lesser quantities. Spelter, 5⅛c for carloads, and 5¼c to 5½c for lesser amounts. Sheet zinc, 5.75c per 100 lb. for 600-lb. casks, with 20c advance for less than carload lots. Pig tin, 29¾c for car lots, and 30¼c for less than carload lots. Antimony, 8½c to 8¾c for Cookson's, and 7¼c to 7½c for Hallett's. Nickel, 45c to 60c, according to amount and deliveries. Buying prices of old metals are as follows: Copper wire and heavy, 11c; copper bottoms, 10c; copper clips, 10½c; red brass, 9⅞c; yellow brass (heavy), 7¾c; yellow brass borings, 6c; red brass borings, 8c; light brass, 5½c; pipe lead, 3.90c; tea lead, 3⅜c.

With the resumption of operations at the North Sharon, Pa., plant of the Carnegie Steel Co., under the management of W. H. Lewis, a number of changes have been made in the official force, and the offices have been removed to South Sharon. W. E. Porter has been appointed superintendent of the plant. At the South Sharon office, John Williams, formerly paymaster, has been appointed assistant to Manager Lewis and B. Bembow has been appointed paymaster.

NEW FURNACES IN THE PITTSBURG DISTRICT.

The order of the common pleas court at Pittsburg, perpetually enjoining the Jones & Laughlin Steel Co. from permitting its Eliza furnaces to emit clouds of dust has not yet been issued as directed by the supreme court of Pennsylvania in its decision last week. The court will doubtless give the company a reasonable time in which to overcome the frequent slipping by which clouds of dust are sent into the air, but whether any time allowance will be granted or whether all the furnaces will be compelled to shut down until such changes can be made as will relieve conditions to some extent remains to be seen. During the past few months there have been fewer slips and as a result there has been less complaint on account of the dissemination of ore and flue dust. The slower operation of the furnaces has obviated the trouble to a very great extent. This week Eliza furnace No. 5 was blown in. This is the stack on which work was commenced nearly a year ago, and its operation will be watched with much interest. The stack is only 85 feet high and has a bosh diameter of 21 feet. The other Eliza furnaces are 100 x 22 feet. The rated capacity of the new stack is 450 tons. The slope of this furnace is much greater than that of any of the other four stacks in the group, and the reduction of 15 feet from the height of the other four furnaces is in keeping with latter-day furnace practice where a high percentage of Mesabi ore is used. The other furnaces in this group are 100 feet high and have a bosh diameter of 22 feet. Thus it will be seen that the new stack has been reduced 15 feet in height while the bosh diameter has only been reduced one foot. The height and bosh of this stack are the same as the dimensions of the Clairton furnaces, which were designed to use a large percentage of Mesabi ores and where phenomenal results have been attained. While these furnaces were only rated at 450 tons daily they have produced close to 600 tons, and slips have been very few, and those that have occurred have not affected the metal very materially. There is little doubt but that the new Eliza stack will show fewer slips than the other four furnaces, and if the operations overcome the trouble experienced at the other stacks, it is altogether possible that the other furnaces will be cut down in size from 10 to 15 feet. The Jones & Laughlin Steel Co. now has six active furnaces with capacity sufficient to meet all requirements of its steel works.

The Carnegie Steel Co. this week blew in one of its new furnaces of the Union plant at Donora, Pa. There are two stacks and the second will be blown in about May 1. The furnaces have a rated daily capacity of about 550 tons. Basic iron will be produced entirely, the metal to be used in the open-hearth plant of the Union works. The Clairton Steel Co. is also preparing to blow in furnace No. 3 at Clairton, Pa. This furnace has been under construction for more than a year and when the lull in the iron and steel trade occurred last fall work was almost entirely suspended. Stack No. 1 of this plant will resume about the 10th of this month. This furnace was blown in about a year ago and has been idle for several months. The Clairton furnaces are all 85 feet high and have a bosh diameter of 21 feet. Furnace No. 4 of the Ohio plant of the Carnegie Steel Co., at Youngstown, O., will commence operations about June 1, while No. 3 at this plant will resume about the middle of May. Furnace No. 2 at the South Sharon Works of the Carnegie Steel Co. will commence operations the latter part of this month while stack No. 3 will be blown in July 1. At New Castle, Pa., the Carnegie Steel Co. is rebuilding two of its stacks and they cannot possibly resume until late in the summer.

Two of the seven furnaces of steel companies that were planned to be in by July 1 are now in operation, while the other five are to come in from time to time until the middle of the year. These furnaces will have a daily capacity of 3,500 tons or an annual output of a little over 1,000,000 tons. In addition, the LaBelle Iron Works, Steubenville, O., and the National Tube Co., Lorain, O., have stacks under erection which will be blown in later in the year.

During March the Shenango Valley steel mill of the Carnegie Steel Co., New Castle, Pa., broke all previous records by producing 40,000 tons of steel. The best previous record was 35,000 tons.

PERSONAL.

E. A. Muller, superintendent of the Springfield Machine Tool Co., Springfield, O., has resigned to accept a similar position with the King Machine Tool Co., the change taking effect May 15. Mr. Muller will become connected officially with the latter company.

The Canadian Westinghouse Co., Ltd., of Hamilton, Ont., has recently engaged C. C. Starr, who was formerly connected with the firm of John Starr, Son & Co., to act as its representative in the Maritime Provinces, with headquarters at 134 Granville street, Halifax, Nova Scotia.

President and General Manager H. Coulby, of the Pittsburg Steamship Co., with general offices in Cleveland, has made the following announcement: "This company has accepted the resignations of the following gentlemen: J. F. Hayes, chief engineer; W. E. Gaynor, purchasing agent; J. W. Wolvin, assistant to vice president. With appointments recently made, the organization will stand as follows: L. W. Powell, vice president, Duluth; C. E. Schelde, treasurer, New York; George D. Swift, assistant treasurer, Duluth; J. H. Hoyt, secretary, Cleveland; W. M. Jeffery, auditor, Duluth; A. F. Harvey, assistant general manager, Cleveland; E. C. Collins, traffic manager, Cleveland; W. W. Smith, superintendent, Cleveland; W. W. Watterson, assistant superintendent, Cleveland; F. B. Smith, chief engineer, Cleveland; Louis Hausheer Jr., stores manager, Cleveland; E. H. Houghton, agent, Duluth."

Thos. H. Richardson, formerly vice president and treasurer of the Fosdick Machine Tool Co., of Cincinnati, has severed his connection with the company and is now connected with the Youghiogheny & Ohio Coal Co.

H. G. Welsh, chief auditor of the Westinghouse Air Brake Co., Wilmerding, Pa., has been appointed superintendent of production and stores to succeed John I. Rankin who recently resigned.

James Gibbs has been appointed assistant superintendent of the tube department of the Wheeling Steel & Iron Co., Wheeling, W. Va.

John Warner, assistant to the first vice president of the American Sheet & Tin Plate Co., of Pittsburg, has resigned and has been succeeded by S. A. Davis, district manager of the company in charge of the Kiskiminetas Valley sheet mills and New Kensington tin mills. John Warner has been identified with the sheet business for many years, having been the founder of the old Struthers plant at Struthers, O. When the American Sheet Steel Co. was formed he was made manager of the various plants located in Ohio.

Benjamin Dailey, formerly manager of the lap weld department of the tube mill of Spang, Chalfant & Co., Pittsburg, has been appointed assistant to superintendent Frank Williams. P. D. Haggerty succeeds Mr. Dailey.

W. B. Dickson, second vice president of the United States Steel Corporation, sailed for Europe March 31.

W. D. Sargent, formerly president of the American Brake Shoe & Foundry Co., sailed for Europe March 24 and will be absent until the latter part of the year.

The board of directors of the Ingersoll-Sergeant Drill Co. at a meeting held March 24 passed resolutions in eulogy of their late president, Wm. R. Grace. Wm. L. Saunders, who has been vice president since 1897, is Mr. Grace's successor.

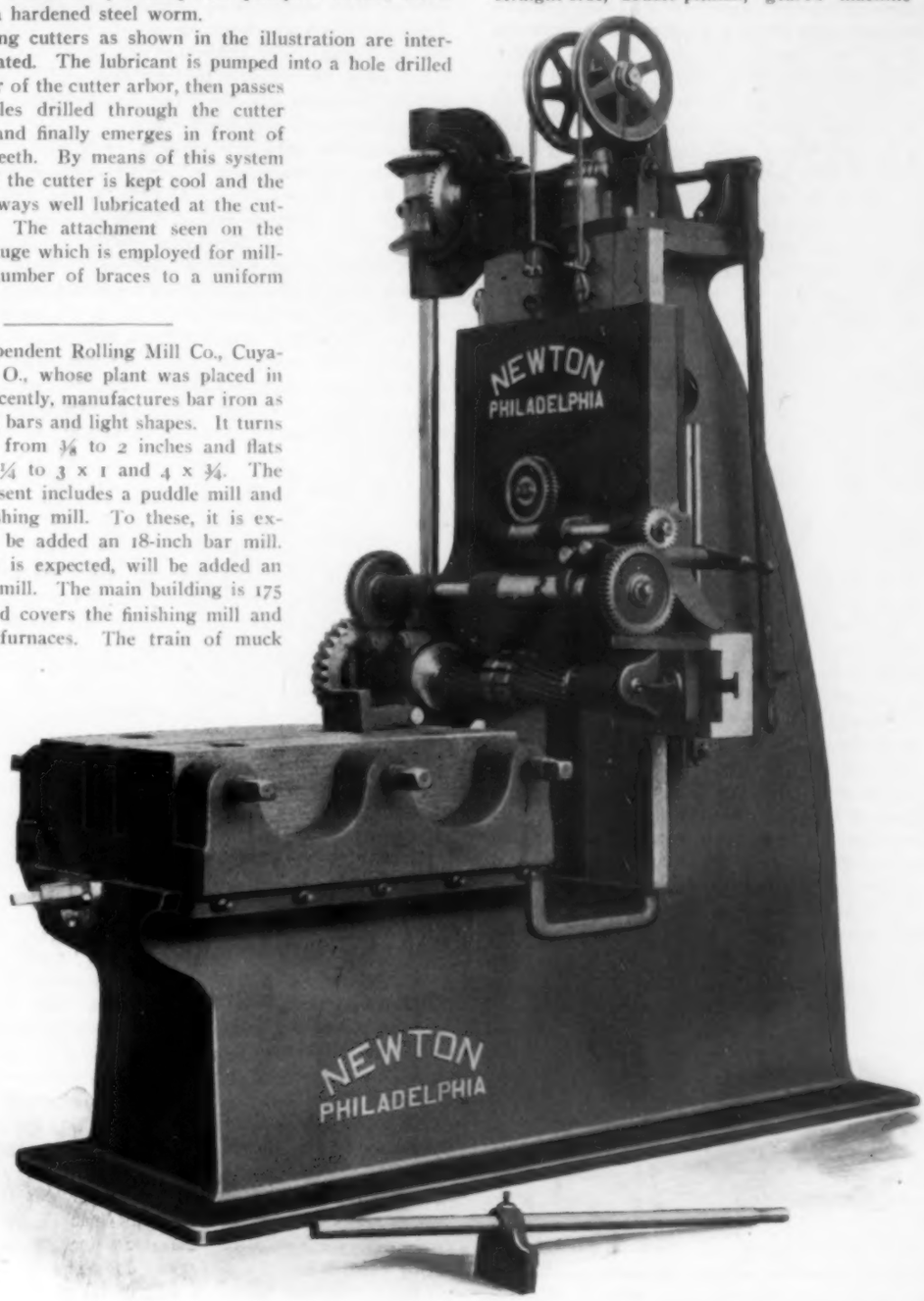
A. J. Lindemann, president of the A. J. Lindemann & Hoverson Co., Milwaukee, Wis., manufacturer of stoves and sheet metal work, was presented a life-size bust oil painting of himself, on Saturday, April 2, by the foreman and department managers of the works and office force. The occasion was Mr. Lindemann's fiftieth birthday.

Samuel Groves, of Pittsburg, whose contributions to foundry literature are well remembered, concluded a six months' course on descriptive metallurgy before a class at the Pittsburg Y. M. C. A. on the evening of March 29, with a lecture on "Mine, Furnace and Foundry." It was a recapitulation of the principles laid down in the 24 lectures. Previous to the lecture the class gave Mr. Groves a dinner and presented him with a compound microscope with full objectives.

BRACE MILLING MACHINE.

A new brace milling machine is built by the Newton Machine Tool Works, of Philadelphia, designed for milling off and chamfering two braces or stiffening pieces at one time. The spindle saddle is counterweighted and there are four changes of positive feed through gears with an automatic throw-out and power quick movement in either direction. The spindle is driven by a steep lead phosphor bronze worm wheel and a hardened steel worm.

The milling cutters as shown in the illustration are internally lubricated. The lubricant is pumped into a hole drilled in the center of the cutter arbor, then passes through holes drilled through the cutter and arbor and finally emerges in front of the cutter teeth. By means of this system the body of the cutter is kept cool and the teeth are always well lubricated at the cutting point. The attachment seen on the floor is a gauge which is employed for milling off a number of braces to a uniform size.



BRACE MILLING MACHINE.

The Independent Rolling Mill Co., Cuyahoga Falls, O., whose plant was placed in operation recently, manufactures bar iron as well as steel bars and light shapes. It turns out rounds from ⅜ to 2 inches and flats from ½ x ¼ to 3 x 1 and 4 x ¾. The plant at present includes a puddle mill and 10-inch finishing mill. To these, it is expected, will be added an 18-inch bar mill. To these, it is expected, will be added an 18-inch bar mill. The main building is 175 x 300 ft. and covers the finishing mill and muck mill furnaces. The train of muck rolls was moved from the plant of the Kelly Nail & Iron Co., Ironton, O. The squeezers are new and are operated independently by a 200-h. p. Corliss engine. The rolls are propelled by an 800-h. p. Lane & Bodley Corliss engine. The finishing train is propelled by a 750-h. p. William Tod engine. This company was organized last year and took over the property of the Ohio Iron & Steel Specialty Co. The old plant was overhauled and greatly improved. The sales agent is the E. D. Rogers Co., Cleveland.

The Favorite Stove & Range Co., Piqua, O., recently incorporated, has formerly been operating under the laws of West Virginia, but is now under the Ohio charter.

A LARGE SECTIONAL PUNCH AND DIE.

BY A. F. HORTON.

The drawings illustrate a large sectional punch and die for blanking the feeding plate of a box nailer; the drawings also show the piercing tools for the holes and the finished blank. The punched blank is 30 inches long by 11¾ inches at its greatest width; the stock is soft steel .110 thick. The press is a straight-side, double-pitman, geared machine measuring 54 inches between the housings. The blanking die comprises nine sections set into a cast iron holder, fitting on all sides and fastened with fillister head screws and dowels. The stripper is made of boiler-plate one inch thick and fitted to the punch to serve as a guide. This also is fastened to the holder with fillister head screws and dowels. Some details of the method used in manufacturing these large dies will be of interest:

The first operation consisted in making a template exactly the shape desired, containing all the holes (to the sizes and positions required). The template was used in fitting the die and for reference when the die was hardened and ground. The template was fitted to a machine and was known to be cor-

rect. The steel for the die was obtained in pieces to meet the requirements for widths and lengths, the thickness being 2⅝ inches, then planed on both sides and one edge. A large plate was next obtained and four parallels fastened to it with screws and dowels to form the two sides and the end of a frame to which the die was fitted; the parallels also determined the dimensions of the inside of dieholder. The steel was cut in sections, each one having the two sides on a certain degree of angle to miter them exactly and also act as wedges with each other. The ends were then scraped and filed until the

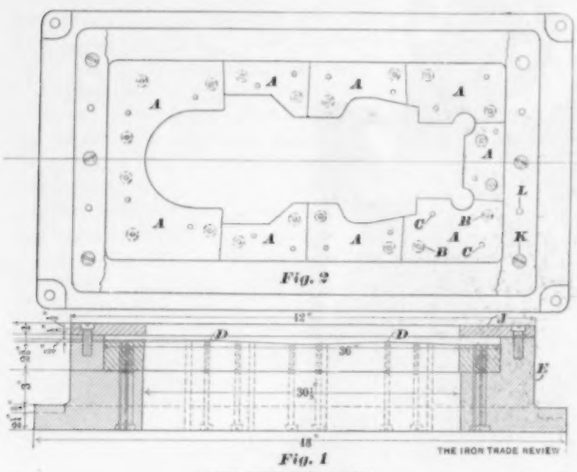


Fig. 2

Fig. 1

THE SECTIONAL DIE.

two that were to fit together would have a good spot bearing; at the same time the back of sections to bear against the cast iron holder would be accurately in line. After the nine sections had been fitted in this manner, the back edges all bearing against the parallels and every joint in the die mitering tight, the template was laid on the die. I will say here that no extra stock was left for grinding on the sides of the sections, as it was expected the pieces would swell enough in hardening to allow for grinding, and this proved to be right.

The sections of the die were wedged tight in the frame and the template rested on the die and in the center; then with a sharp scriber the outline of the template was drawn on the face of the die. Each section was now taken from the frame and placed in the shaper and the surplus stock cut down to the line. Then came the filing, each section being filed and fitted until the template would fit and slip through the die. The

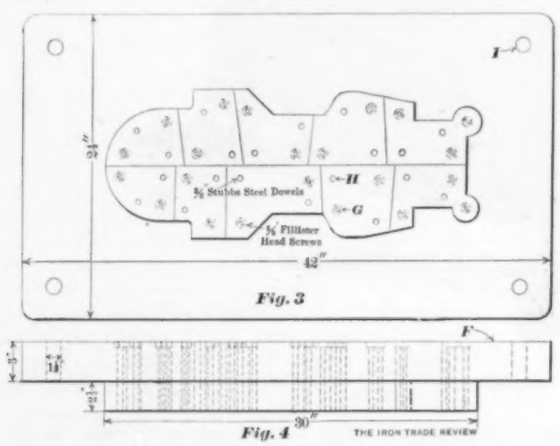


Fig. 3

Fig. 4

THE BLANKING PUNCH.

cutting edge of the die was left about 5-16 inch straight, the remainder tapered to a clearance that the template would drop through easily. The sections of the die are shown in Fig. 2 at A.

The next operation consisted of drilling and tapping the screw holes B and drilling the holes for dowels C; all the sections contained two screws and two dowels, except the two largest sections on the end which contained three screws. After these holes were drilled the die was again assembled in the frame and laid out for the two shearing points D in Fig. 1. The top of sections was then planed as shown in Fig. 1, which is a sectional view of the die on the center line. The length of the die required two shearing points and these were planed 3-16 inch high, and as the stock used was .110 thick the center of the blank was cut before the ends commenced to do their work. This was found to be a great advantage, as the die having two shearing portions kept the blank straight. The sections were again placed in the frame and the face of the die just sheared was filed and finished and the die was ready for hardening. The hardening was done in a gas furnace, which gave the sections an even heat and resulted in each section hardening uniform. The sections were then polished and tempered to a dark straw color.

The sections were now ready to be fitted for the last time and each piece was found to have expanded from .003 to .006 inch, which allowed enough to grind as the sections had not changed their shape by heating. The grinding was done on a surface grinder, the edges being ground and fitted first. The fitting at this point required very careful work as a definite amount of stock must be removed from each piece to make the sections miter, the interior of the die fit the template, the outside ends and edges exactly straight and the ends square with the sides. The reader will see at once the amount of delicate work necessary when only a small portion of stock is removed. Having the die fitted the next operation consisted of grinding the top. This was accomplished by placing one-half of the die

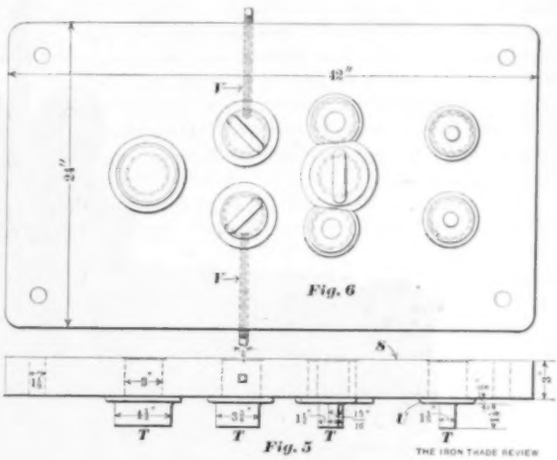


Fig. 6

Fig. 5

THE PIERCING PUNCH.

in a holder fastening it by use of the screw and dowel holes in sections, the holder in turn being fastened to the bed of grinder and being tilted to an angle equal to the shear on the die. After one side of the shear has been ground the holder is loosened and tilted in the opposite direction and the remaining side of shear ground. The remaining half of die was treated in a like manner, this work making the die ready for the holder. The holder E was next finished, the bottom and top being planed with the two ends of holder projecting above the face of the die to which the stripper was fastened. The holder was then placed on a milling machine and the part in which the die was placed milled 2⅜ inches deep, this depth being equal to the lowest part of die. The die is next placed in the holder and the screw and dowel pin holes transferred through the steel sections, and these being hardened serve as steel bushings.

Having completed this part of the work the screws and dowels were put in place and the die now fastened in its natural position, the hole in die stoned to fit the template. The stripper consists of a piece of boiler plate 1 inch thick, planed on all sides. The fitting of the stripper could not be accomplished until the punch had been completed, as the stripper must be an exact fit to the punch, and after being fastened to the die holder served as a guide to the punch when setting the die and also prevents the punch and die from creeping. The punch is shown in Figs. 3 and 4 and has sections similar to the die. There are ten sections divided from the center line so the miter of each section will not intersect with the opposite section. The bed plate was cast iron, the punch being

fastened by screws G and the dowels H. The sections of the punch were first planed and milled, then mitered; afterwards the template was placed on the punch and with a scriber the outline was scratched on the punch. The sections were then removed one by one and placed in a shaper and the surplus stock removed to the line after which they were placed on the holder and set in the press and sheared. The sections were then removed, filed to the part just sheared and this work was continued until the punch had been fitted to the die perfectly. The sections are now removed, hardened and tempered, the edges

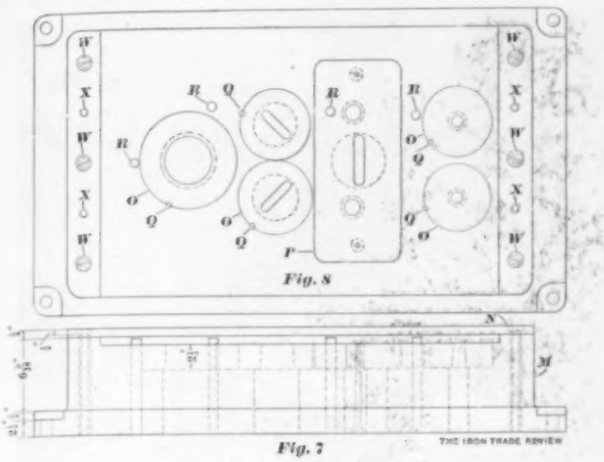


Fig. 7

THE PIERCING DIE.

ground to miter perfectly, then fastened to the holder by the screws and dowels, the outside edges then stoned until they fit the die. This completed the punch, the holes I serving to secure the punch to the gate of the press.

The stripper of the die was next considered. The punch and die were placed in the press and set in proper position after which the gate is raised to its highest point, the stripper J having been planed and the holes drilled for the screws K and the dowels L. The stripper was fastened in place, the gate of the press lowered until the face of the punch rests on the stripper and with a scriber the outline of the punch was marked on the stripper. The gate is then raised and the stripper removed and the stock from the center of stripper milled out to allow punch to pass through. The stripper is replaced, the punch sheared through and the two fitted together. While this operation is being done a series of wedges is used between the stripper and die to keep it straight. This completed the punch and die for blanking.

The next item concerns the tools for piercing the holes. The piercing die shown in Figs. 7 and 8 was used in the same press as the blanking tools, therefore this punch and die must be equal in height to the one already described. The die block

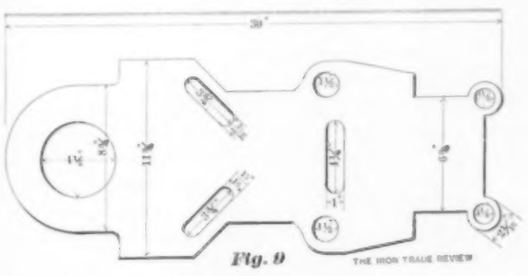


Fig. 9

THE WORK REQUIRED.

M was of cast iron planed on the top and bottom with the two ends projecting above the surface of the die to which the stripper is fastened, the same as in the blanking die. The holes to be pierced are shown in the sketch of the blank, Fig. 9, there being three oblong and five round openings. The template containing the holes the exact size and location was laid on the cast iron holder for the piercing die and with a scriber the outline of template and holes was marked out. The holder was then placed on a horizontal mill and the holes bored large enough to allow the punched blanks to drop through. The five holes O were next counterbored 2¼ inches deep, to which the steel dies are fitted. The remaining three holes holding positions close to one another are located in one die. The holder was then placed on the milling machine and the space for the oblong die milled, this also being 2¼ inches deep. The holder was now ready to receive the steel dies, the five round dies being turned and fitted to the holes to a driving fit, the oblong die P planed and fitted also to a driving fit. This die is held in place by screws and dowels. Having all the steel dies in place, the template was again placed upon the holder, the outside edge of template exactly on the lines previously scribed, and held in this position the holes were again marked, the steel dies removed and the holes bored in them to the desired size. The round dies were now fastened in place, the position being determined by the dowels Q, which were drilled half in the cat iron holder and half in the die. The steel dies were then ready to be hardened and tempered, after which the shrinkage was ground from the holes and the face finished by the grinder to a cutting edge. The die was again placed in the holder and the screws and dowels placed in position, the holes for guide pins R drilled and pins of Stubbs steel inserted. These pins determine the position of blanks while the operation of piercing the holes is being done.

The die was now complete with the exception of the stripper, which is finished after the punch.

The piercing punch shown in Figs. 5 and 6 was next taken in hand, the punch holder S being of cast iron, 3 inches thick, planed on both sides, and then placed face down upon the die holder resting on the projections on the end to which the stripper is to be fastened. The dies were driven out until the face rested against the surface of the punch holder. The scriber was again brought into use and the outline of holes scribed on the face of punch holder. The holder was removed, the dies driven back into position and the exact center of the holes thus obtained on the holder. It was put upon the horizontal mill and the holes bored 3 inches in diameter, after which they were slightly beveled on the back to allow for riveting the punches. The punches, T, were turned, the ends finished to a driving fit in the holder and a collar U made on all the punches to give good backing against the holder. The round punches were turned on the cutting end the size desired, allowing .005 inch for grinding, then hardened, tempered and ground to fit the dies. The punches that fit the oblong die were milled on the collar as shown in Fig. 6; this prevents the center punch from turning out of position. After they had been fitted to the holder they were all placed in their respective positions, the oblong punches, being then round, resting on the top of their respective dies, the hardened punches being forced into the dies they were to fit a short distance, which determines the position of the holder when the punches are in place. The outline of the oblong dies was then scribed on the face of the punches, the punches taken out and the surplus stock removed and the punches fitted to the dies. This was done by working the stock off to the line and then placing in the press as previously described, the oblong punches sheared into the dies, after which they were hardened, tempered and stoned to the proper fit. The two separate oblong punches are held in position by the screws V to prevent them from twisting.

The stripper N and the die-holder having been drilled for the screws W and the dowels X, the punch and die was again placed in the press and set, the punches fitting in the dies, the gate raised to the highest point, and the stripper fastened to the die. The gate was lowered until the punches rested on the stripper, the outline of the punches then scribed, the gate again raised, the stripper removed and bored to fit the punches. As in the case of the blanking die, the stripper serves as a guide for the punches.

The dies are now complete and the blanks obtained from them prove to be perfect in every respect. Though expensive to make, the dies soon paid for themselves in the saving of labor they performed.

Word has been received that fully 5,000 tons of agricultural machinery shipped this season by American manufacturers to Windau on the Baltic and intended for the Siberian markets will be held at Windau owing to the war between Russia and Japan.

The Crocker-Wheeler Plant at Ampere, N. J., and Its Power Distribution.

The Crocker-Wheeler plant is and has been the manufacturing development of two well-known electrical men. One is Dr. S. S. Wheeler, a past president of the American Institute of Electrical Engineers, and for some the electrical expert on the Board of Electric Control of New York, and in this latter capacity remembered for the energetic method of introducing and enforcing civic legislation relating to highway electrical conditions. His associate is Prof. Francis B. Crocker, who is professor of electrical engineering at Columbia University, New York. Their first shop was started in New York late in the eighties, in very limited quarters. The business expanded to an extent which warranted removal to a site with greater opportunities for increasing space than in a crowded section of a large city. The change of location was made in 1893 and the works were taken out to East Orange, N. J. This is on the Delaware, Lackawanna & Western railroad and a depot has been established here called Ampere after the eminent French scientist whose name is also given to the unit of electric current. The enterprise was conducted without serious check until the spring of 1895, when a fire destroyed the machine shop, packing room and storehouse.

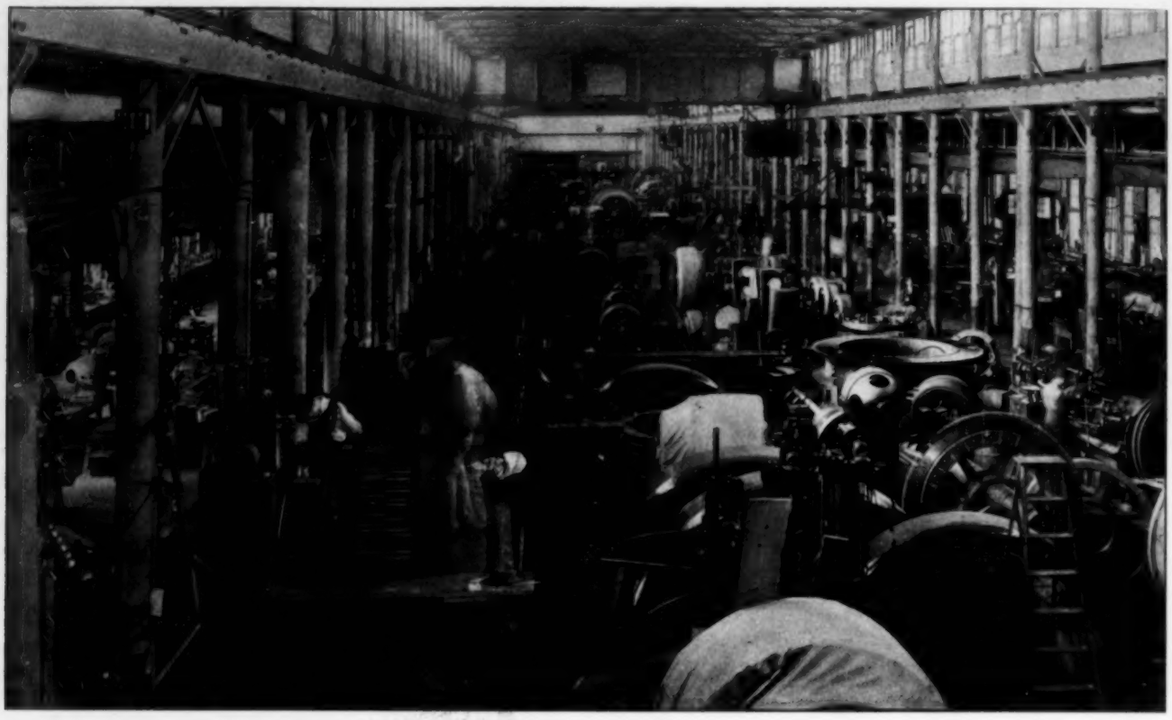


FIG. 1.—MAIN BAY OF MACHINE SHOP.

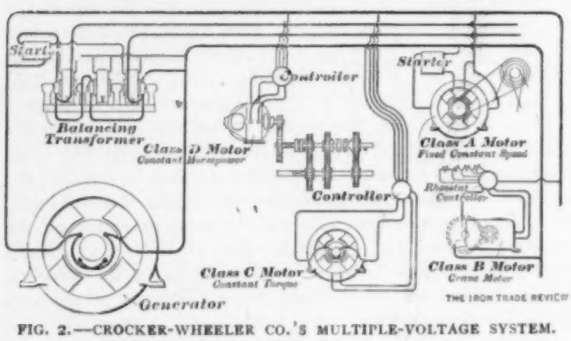


FIG. 2.—CROCKER-WHEELER CO.'S MULTIPLE-VOLTAGE SYSTEM.

A Fire that had Compensations.

The fire at the shops at Ampere was if nothing more an object lesson in the flexibility of individual electrical drives, the firm being a pioneer in this method of power distribution. The engine room was an entirely separate unit with cables running through a tunnel to the main building and thence along the length of the factory floor in conduits. A few machines have been and are still run from a short length of shafting driven by a single motor, but this is only in the case of machines of light power and is quite exceptional in the factory equipment. Nearly every one of the machines is driven by an individual motor mounted on the frame of that particular tool and there is a marked freedom from line shafts, with all the ills they may entail, including frictional losses, dripping oil, the numerous phases of the belt problem in uneven tension, obstruction to light, scattering dust, care of fastenings and surface, and the several items that go with belt drives at their worst.

The machine with individual electric drive has also the merit of considerable freedom in location, and with a good foundation and a couple of wires can do excellent work without reference to the placing of line shafts or the grouping of other tools. The fire at the plant was not therefore so much of a disaster as might have been the case under other conditions, and tents and sheds were hastily erected, wires strung in temporary but sufficient manner and manufacturing facilities were impaired but for a very limited time. As a matter of fact the destruction of the property was largely nullified by the adaptability of the factory machinery and it was found at the end of the year that the company had turned out more work than in any previous period of the same length. And this maximum output was in spite of the handicap of rebuilding.

The main entrance of the offices at Ampere is reached by a stone walk from the depot. The executive offices of the company, the engineering department, drafting room, blue print room, etc., are located in a three-story office building of red pressed brick. In the rear of this structure is the machine shop, 450 x 100 feet, Fig. 1, and on the further side of the office from the railroad is a three story factory building, 200 x 75 feet, of heavy mill construction. The latter building is used for general factory purposes and in the rear of the two large

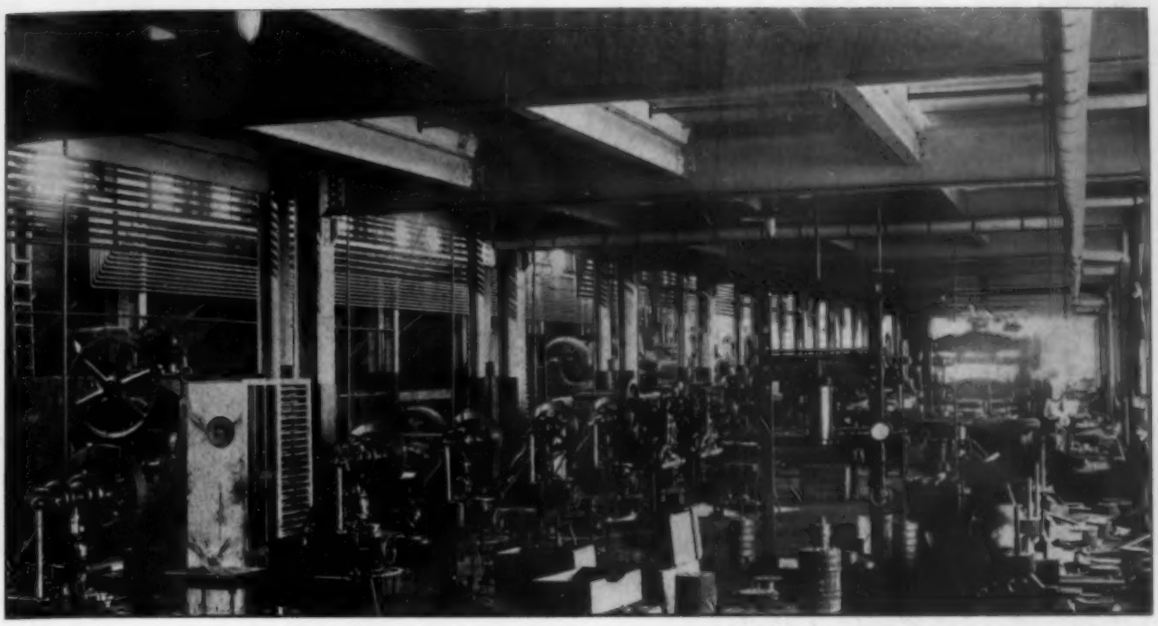


FIG. 3.—THE ARMATURE PUNCHING DEPARTMENT.

buildings are smaller buildings for storage and further factory purposes.

Power House and Equipment.

In front of the three-story factory building and to the east of the office and machine shop is the power house. This is an isolated building with engine and boiler departments separated by a brick fire wall. The boiler room has four 100-h. p. return tubular boilers with McClave shaking and dumping grates and the smoke breeching leads to a 140-inch American Blower Co.'s fan discharging into the base of a 90-foot brick stack. The boiler room is supplied with feed water from a private reservoir by a duplex pump of Worthington manufacture. The feed water passes through a receiver and drains by gravity to a Warren Webster heater and is thence forced into the boilers by a second Worthington duplex pump. The engine room has six direct current generators, three for testing purposes and the remainder for power. These are driven by four engines. A 16 x 15-inch McIntosh & Seymour Co. engine of 150 h. p. drives the three generators. The first is direct connected to the engine and runs at 250 revolutions per minute with a capacity of 75 k. w. at 125 volts; the other two are tandem belted from the flywheel on the opposite side of the engine to the first generator. One of these has a capacity of 90 k. w. at 550 volts when running at 625 r. p. m. and the other at 110 k. w. has a speed of 720 r. p. m. An 18 x 30 x 18-inch tandem compound horizontal Harrisburg engine at 200 r. p. m. is direct connected to a generator with a capacity of 200 k. w. at 240 volts. A 16 x 30-inch Hewes & Phillips Co.'s Corliss engine at 124 r. p. m. drives a generator of 90 k. w. and 240 volts capacity, and a direct connected 10 x 10-inch Ames Iron Works engine operates a 32-k. w. 240 volt, generator, at 300 r. p. m. Compressed air is employed for the pneumatic chippers and cleaning conveniences and the supply is furnished by a Rand Drill Co.'s two stage compressor having a capacity of 300 cubic feet per minute and a delivery pressure of 100 pounds to the square inch. The engine room has also an 18 x 10 x 12-inch fire pump of Worthington type. The switch board has nine

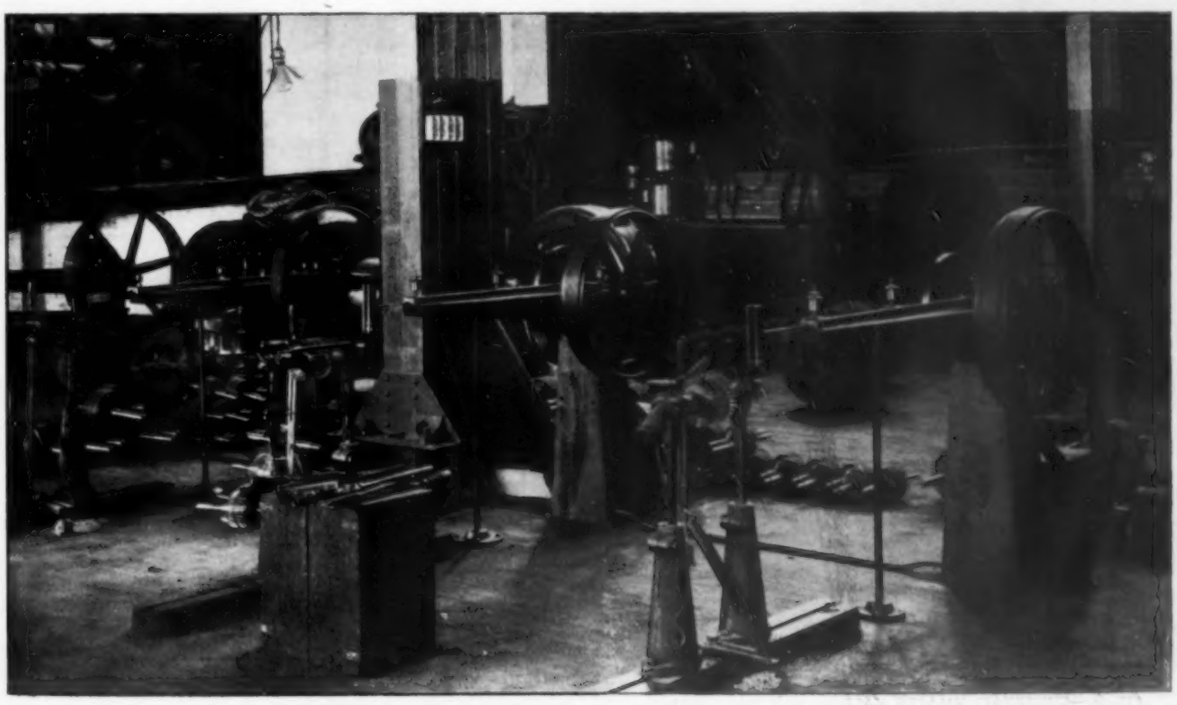


FIG. 4.—GROUP OF FILING MACHINES WITH POWER DRIVE.

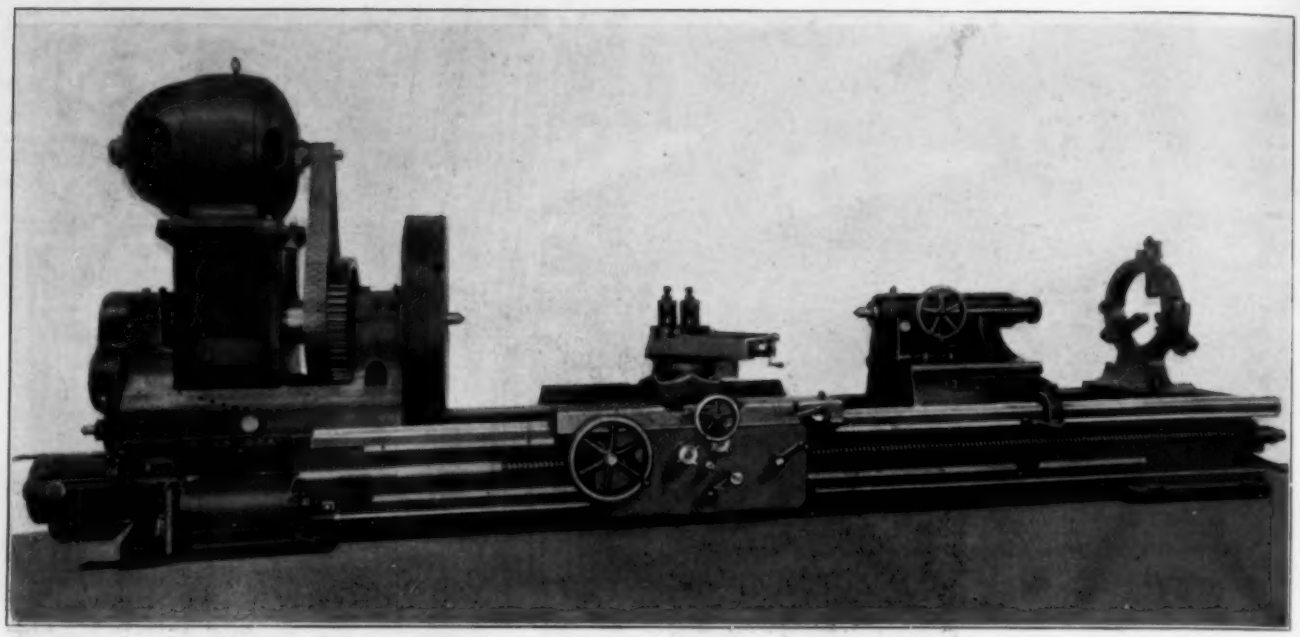


FIG. 5.—LODGE & SHIPLEY MACHINE TOOL CO.'S 42-INCH LATHE.

slate panels and is 7 x 15 feet. This is equipped with all the necessary instruments for the measurement and control of the electric current of the various units and includes a 1,000 ampere knife switch for substituting the 240-volt power current for the 250-volt testing current.

The Plan of Individual Drives.

Many factory managers of wide experience are of the opinion that the general introduction of individual drives would mean numerous small motors with much complication and greatly increased cost and on this account they have preferred to limit the application of individual drive to tools requiring from 5 to 10 h. p. and upwards each and have concluded that for less than this amount of power a group system of driving would be best. The Crocker-Wheeler Co. has investigated the question at length and the conclusions derived are of interest. The experience at the plant has convinced the experts that if the saving in the coal bill due to the decreased losses in power transmission by individual drives is only to be considered then the argument for the group drive is based on good grounds. The coal bill, however, amounts to but such a small percentage of the operating expenses of manufacturing establishments that it is claimed a small variation in this one way or the other merits little more than passing atention. The element which ordinarily receives most consideration in well managed factories is that of the labor cost in producing a given piece of work. A small percentage of decrease in the total labor bill will as a rule justify a greatly increased first cost assuming that that cost will directly operate in a reduction of labor. The point to be considered, then, is not the size of the tool to which an electric motor ought to be assigned but the class of work and the character of the shop and thereby the manager determines whether the increased facilities will not offset the greater first cost of the individual drive. The facilities introduced by the individual drive may be enumerated as the instant control of variable speeds over any range and the ability of maintaining high cutting speeds due to the improved possibilities in machine manipulation with an absence of belt troubles. The company further points out the propriety of crediting against the first cost of the individual electric drive the cost of countershafts, hangers and belts together with the cost of increased power to overcome friction losses due to the shafts getting out of line and the time required for lacing and belt repairs as well as the time outlay on stopping, starting and the changing of speeds in machine manipulation.

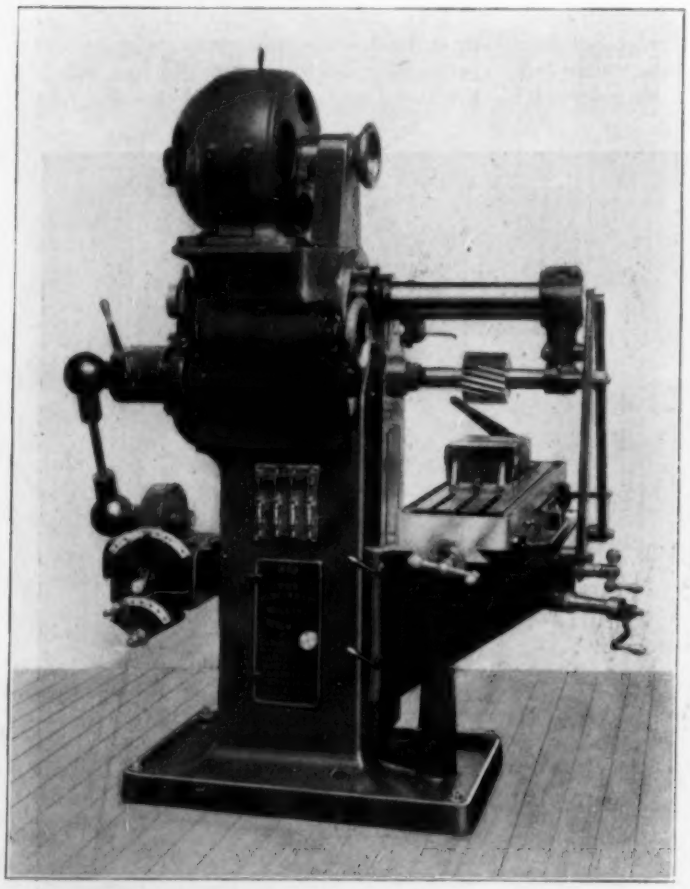


FIG. 6.—CINCINNATI MILLING MACHINE CO'S NO. 3 MILLER

The convenience of portable tools in bringing machines to the work is a further development of the individual electric drive and this also permits of ready rearrangement of the tool equipment should this be found advisable at any time. There is too the advantage of avoiding any overhead construction which may prove a hindrance to light. As may easily be seen in any modern plant, light is a valuable asset in increasing the shop rate of production and the absence of overhead rigging for the tools greatly assists the lighting facilities of a workshop with much machinery. One of the advantages urged for an individual electric drive is the possibility of placing the speed control of the driven tool at the immediate will of the workman.

System of Variable Speed Control.

This leads naturally to a consideration of the Crocker-Wheeler system of variable speed control as illustrated in the diagram, Fig. 2. Power is distributed about the plant by the various circuits each consisting of two main cables for supplying all constant speed motors, lights, crane motors, etc. In addition to these, those circuits going to variable speed tools have two additional wires with unequal voltages between all four, giving six separate and distinct voltages. The speed of a constantly excited shunt motor is proportional to the volt-

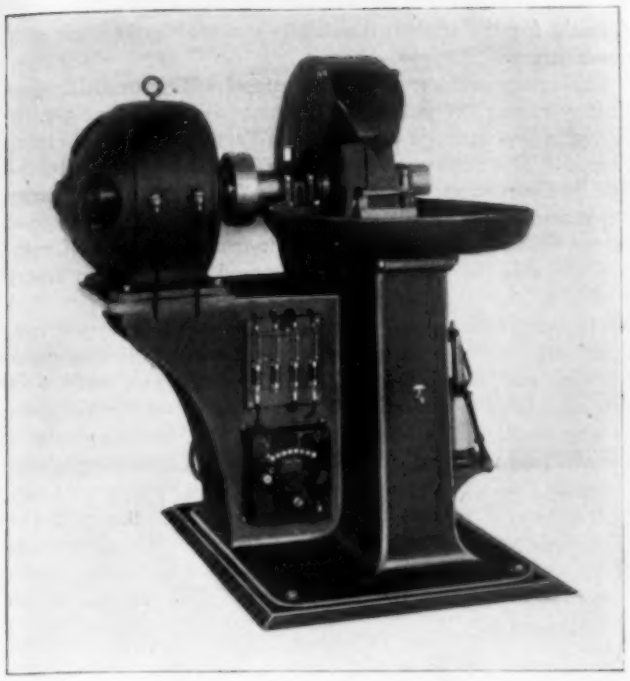


FIG. 7.—BRIDGEPORT SAFETY EMERY WHEEL CO'S DIRECT DRIVEN GRINDER.

age impressed upon the armature terminals. The above six voltages therefor give as many speeds to motors connected to the four-wire system. By the use of slight amounts of field resistance this number of speeds may be extended as far as desired. Many belt driven tools have a speed range obtained by mechanical means of from 20 to 1 to 50 to 1, with speed increments of 30 to 50 percent. The Crocker-Wheeler system not only extends this range but reduces the step variation to about 10 percent, found by experience to be as small an amount as desirable to use. The highest voltage on the system is supplied from the main generators and the voltages between the various wires of the four-wire circuits are obtained by a three unit balancing transformer, which subdivides the generator voltage. The transformer also supplies power to any over-loaded circuit and is entirely automatic in its action. Its output is but a small percent of the output of the motors on the four-wire circuit, for these motors which are operating on different voltages tend to balance one another and draw a large proportion of their power from the outside mains. The balancing transformer only has to accommodate the unbalanced portion of this load.

The leads from the main circuit to the motor in each case are made in a four-wire cable which greatly simplifies the wiring. A four-wire switch with fuses is mounted at each machine and this with the controller constitutes all the necessary accessories for this system. It will, therefore, be seen that the system is very simple and can be easily applied to old as well as new shops.

A drum type controller is conveniently mounted on such tools as require variable speed and this is wired to the four-wire circuit. The controller drum travel is quickened by a spring in each case so that the contacts are made and broken at a high velocity, preventing the formation of arcs and avoiding the stopping of the drum between contacts. The six motor speeds are capable of a further refinement by a variation of field strength. The voltage range on the system is thus in practice increased from 6 to 1 by the addition of field resistances to a total range of 10 to 1 and for exceptional requirements this may be extended according to the character of the machine and the work.

Typical Motor Equipment.

The motor equipment of the ordinary shop may be summarized as follows: The constant speed motors are arranged for group drives comprising sets of small machines belted to short lengths of line shafting. This equipment may be classified as A, Fig. 2, and is adopted where the peculiarities of the machines are of a character that flexibility of location, convenience of speed control, etc., do not demand the greater motor outlay on individual drives. The relative economy of the varying ratio between greater or less first cost and much or little independence in machine control is a matter for the exercise of good judgment in each instance. The controllable speed motors, usually of the series wound type, as in crane service, may be designated as of class B. These have an irregular and frequently excessive demand for current and are therefore suitably connected to the main or outside wires and such speed regulation as may be required is obtained by means of rheostats. Class C includes controllable speed motors driving pressure blowers, punching machines, planers, etc., which require constant torque at all speeds, the horsepower diminishing with the speed. The normal horsepower of the motor need not be greater than the maximum demanded by the machine. Class D is inclusive of variable speed motors which, as in the preceding instance, require constant speed at any one of a number of fixed values. This class covers lathes, boring mills, etc., when the turning effort increases as the speed diminishes. A motor for this purpose would be unnecessarily large if employed directly for the entire speed range. A speed range of 3 to 1 has been selected therefore for the determination of the most suitable sizes, and a motor to give constant horsepower through this variation has a normal rating of about twice the horsepower needed by the tool. This range is capable of extension by adding gear trains and a judicious compromise is thus effected between an excessively large motor without gearing and a constant speed motor with many gears.

Various Tools with Electric Drive.

The Crocker-Wheeler Co. does not advise any system of shop practice which is too advanced for the factory at Ampere. The system of electric drive should naturally reach a high standard in a representative shop for the production of electrical apparatus. The example of machinery so equipped is therefore an interesting one and exhibits the manner in which motor equipment has been grafted on standard forms of machine tools. A selection of the more noticeable installations has been made to illustrate the practical application of the Crocker-Wheeler multiple voltage system.

The main bay of the machine shop is shown in Fig. 1 and gives an idea of the overhead space for crane service and the ability to utilize the shop floor to the fullest extent. Another view, Fig. 3, is of the armature punching department. At the left of the latter view is a row of small power punches, near

FIG. 8.—ATLANTIC WORKS' BAND SAW.

the right and in the background is a power press of large size at the front of the picture and in the center is a hydraulic press. Punchings for armature cores are piled in the foreground. Another halftone, Fig. 4, illustrates the special filing machines designed and built by the firm for finishing the slots in the armature cores. This machine makes about 120 strokes per minute. All the tools shown are driven by Crocker-Wheeler motors.

The 42-inch engine lathe, Fig. 5, is made by the Lodge & Shipley Machine Tool Co., of Cincinnati, and is driven through a Morse rocker-joint chain, by a 20 h. p. semi-enclosed motor. The bed is 20 feet long and greatest distance between centers is 11 feet. The machine is designed for finishing cuts on completed armatures, requiring a wide range in speed as cuts are made at both the small shaft and the large armature diameters. It is desirable to make this latter cut without the use of back gears which have a tendency to give an irregularity to the face of the commutator. That a smooth cut may be obtained, a direct drive from motor to spindle is provided and a motor is used of sufficient size to furnish the required horsepower at the lowest speed obtainable from the 21-point controller. The motor's highest speed is 1,320 r. p. m., which gives a spindle speed of 205. With the lowest controller notch the spindle speed of 20.3 is obtained. It is occasionally required to make cuts in cast iron at a large diameter and for this purpose there is a back gear with a ratio of 8.33 to 1. The back gear with the highest motor speed gives a spindle speed of 25 r. p. m. A cut of this kind is used to smooth down an outer surface of the armature spider or the iron rings at the end of the commutator. The controller is mounted in a horizontal position on the front of the frame under the headstock, and is operated through a splined shaft from a handle mounted on the carriage where it is easy of access for the operator.

The Cincinnati Milling Machine Co.'s No. 3 geared feed miller, Fig. 6, is driven by a 7½-h. p. shunt-wound motor. Power is transmitted by a silent chain enclosed in a light cast iron casing. There is a reduction in speed from motor to spindle of 4 to 1, which with two back gear combinations may be increased to 12 to 1 or 28 to 1, the highest possible speed of the spindle being 278 r. p. m. and the lowest 14. There is a hand wheel on the extension of the motor shaft and when current is shut off, the motor may be rotated by hand sufficiently for the teeth to mesh when changing the back gear combination.

The emery grinder, Fig. 7, manufactured by the Bridgeport Safety Emery Wheel Co. is direct driven by a 5-h. p. motor. The wheel is 13 inches in diameter and runs at 650 r. p. m. The armature is connected across the 160 volts, the field being connected to 240 volts. When the wheel is worn down considerably the armature of the motor will be connected across higher voltage wires, and the increased speed of rotation will give the proper peripheral speed to the smaller emery wheel.

The use of the individual motor for tool drives is not confined to the machine shops, but is interestingly applied to woodworking machinery. The halftone, Fig. 8, shows a method for driving a band saw directly which is simple, positive and quite as applicable to an old machine as to one specially designed for the purpose. As a confirmation of this statement it may be added that this saw was built not less than eight years ago, by the Berry & Orton Co., now known as the Atlantic Works, of Philadelphia. The motor is a 3-h. p., shunt wound machine of the enclosed type connected with the saw by a direct coupling. It runs at a speed of about 634 r. p. m., giving the saw a lineal velocity of 6,000 feet per minute. The controlling apparatus, including line switch and starter, is on the opposite side of the machine to that shown in the figure, and so situated as to be within easy reach of the operator.

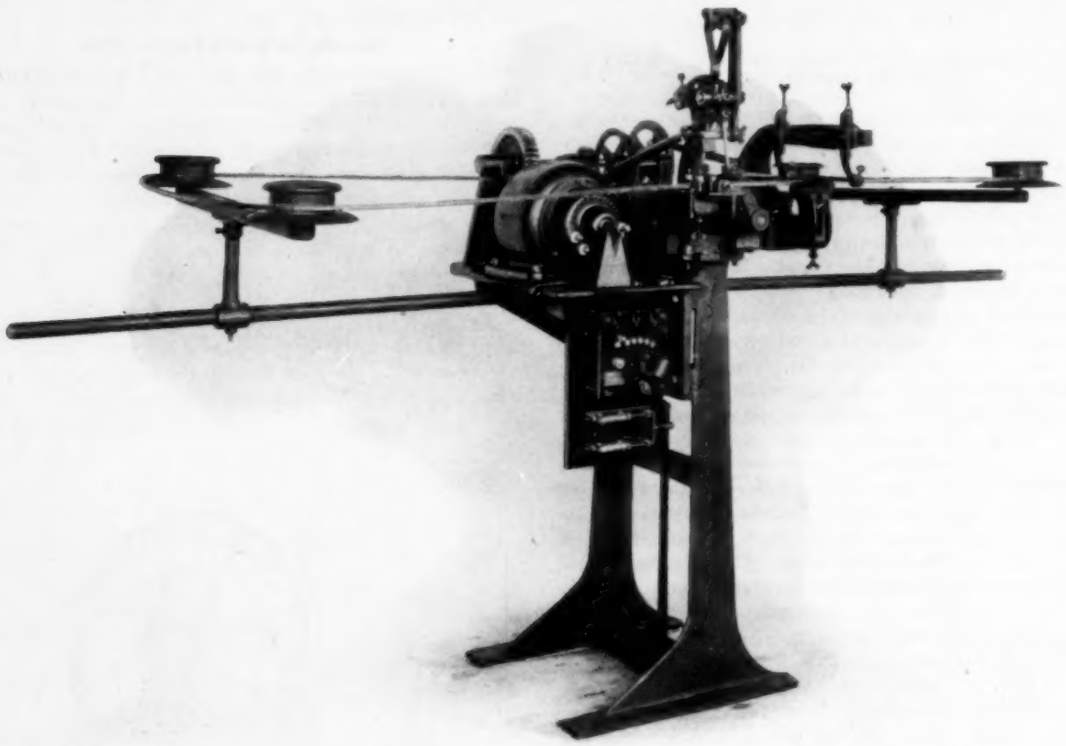


FIG. 9.—MACHINE FOR FILING AND SETTING BAND SAW TEETH.

A machine of more recent manufacture, Fig. 9, may be quite appropriately described in this connection, since it is a special piece of apparatus for filing and setting the teeth of band saws. It is manufactured by the Detrick & Harvey Machine Co. of Baltimore, and has been designed with the object of imitating as nearly as possible the movements made in filing and setting band saws by hand but avoiding the irregularity as shown by the high and low teeth usually following hand filing. Any ordinary three-cornered file may be used and easily fixed in position; the file is used in the forward motion only and can give any desired tooth rake and the amount of set can be regulated with accuracy. This machine is electrically driven by an enclosed type two-pole motor having a rated capacity of ½ h. p. at 1,450 r. p. m. and through a worm gear mechanism imparts to the machine a speed of 60 strokes per minute. At this rate it is capable of setting and filing an ordinary 21-foot band saw in 20 minutes. The location of the mo-

tor is entirely out of the way, falls within the necessary floor space that must be allowed for the machine, and yet is conveniently accessible for oiling, repairing, etc. Other advantages of the outfit will be recognized in the placing of the motor starter and line switch where instant control of the motor is afforded, and in making the extended frame, shown in the illustration supporting the band saw, quickly detachable, allowing the machine when not in use to be stripped down so as to occupy comparatively a small amount of space.

The carpenter shop has other wood working machines of interest, one being a buzz planer and jointer, built by L. Power & Co., of Philadelphia, and the other a No. 2½ single surfacer, or gauge planer made by the J. A. Fay & Egan Co., of Cincinnati. In both cases the motors are mounted against the sides of the beds of the machines and drive through

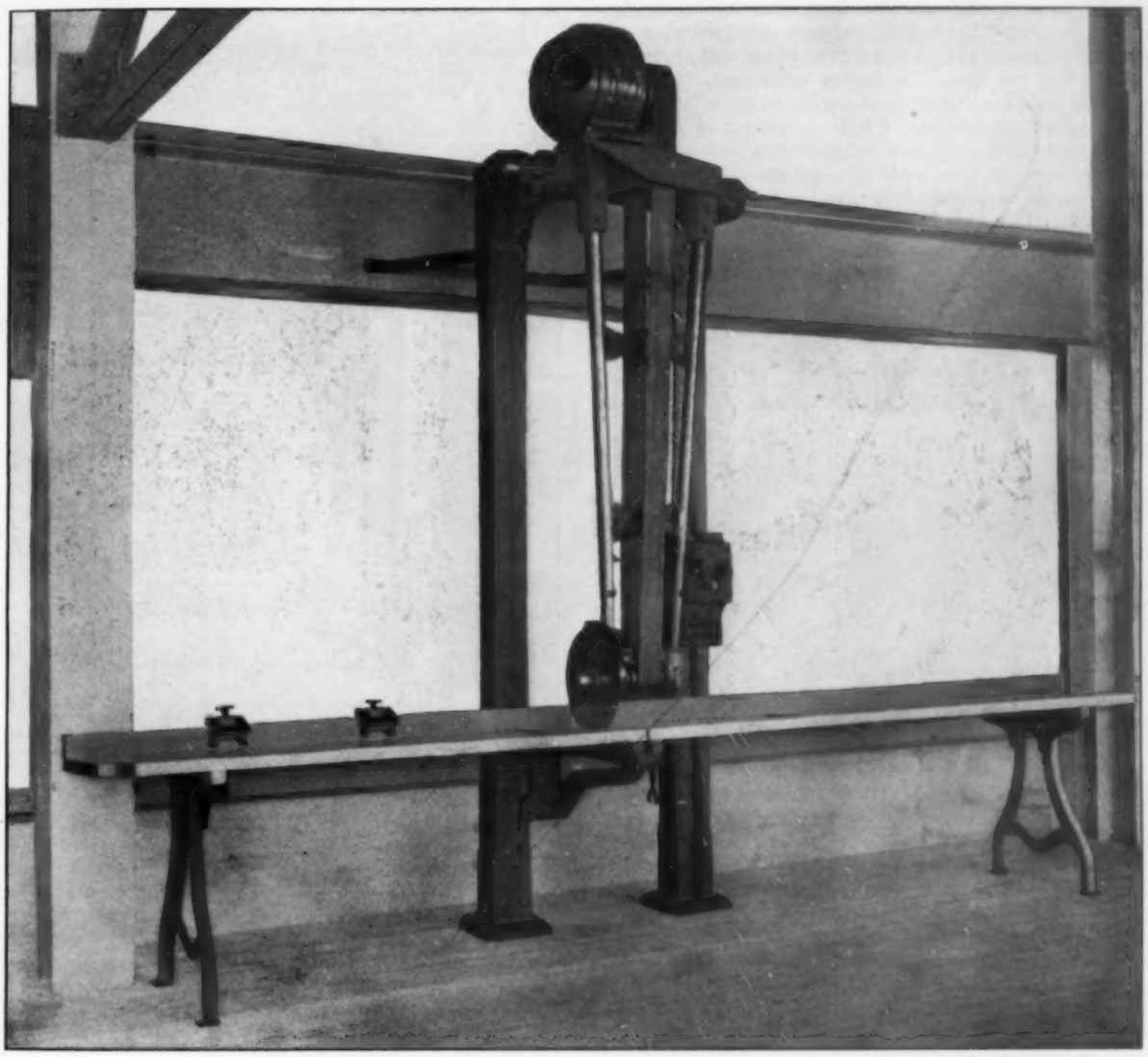


FIG. 10.—MOTOR AS COUNTERBALANCE AND DRIVE OF SWING SAW.

Morse rocker-joint chains, which are enclosed in casings to exclude shavings and to prevent the throwing of oil. The jointer runs at 4,000 r. p. m. and is driven by a 4-h. p. fully enclosed shunt-wound motor, running at 1,170 r. p. m. On account of its high speed, a 13-16-inch chain is strong enough to transmit the power. The surfacer is driven by a 10-h. p. fully enclosed shunt-wound motor, running at 1,100 r. p. m., and the knives of the planer revolve 4,000 times a minute. The chain is two inches wide and has a linear velocity of about 3,500 feet per minute. The feed roller requires about ¾ h. p. and is driven by a 13-16-inch chain running at a much slower speed. Some tests made on this machine before and after applying chain in place of belt drive are interesting. Originally two 5-inch belts were used, one on each end of the spindle. The belts required a greater distance on centers and excessive tension in order to transmit the power. Running idle, the machine absorbed 4 h. p., while in its present condition with chain drive but 2 h. p. is consumed in friction. Moreover with the belts, the heaviest possible cut was taken at 10 h. p., the belt slipping at that point. Obviously with the chain, slip is impossible and the maximum cut depends only on the strength of the chain and the capacity of the motor, which may be overloaded for a short time as much as 50 percent or 15 h. p. A common annoyance with belt drives is the slowing down of the machine due to belt slip when work is introduced. This is entirely avoided with chain drive as there is never a reduction of more than 2 or 3 percent in speed with varying loads.

The only departure from the standard type of motor driven swing saw, as built by M. T. Tidey, of Newark, N. J., is the modified form of the yoke casting from which the frame is suspended in Fig. 10. A semi-enclosed shunt-wound motor drives through a belt connection and runs at a speed of 1,170 r. p. m. at 230 volts. In the halftone the frame is blocked out for the purpose of showing the saw, but ordinarily when not in use it swings back against a stop, this being accomplished automatically by mounting the motor so that its center of gravity is a trifle forward of the center of the trunnions which support the frame work. The saw is 18 inches diameter and runs at about 2,500 r. p. m. The bench is of hard wood supported at the ends by cast iron legs and at the center by a bracket. It is graduated in inches and has two adjustable stops to facilitate the cutting of lengths in duplicate.

VARIABLE FEEDING MECHANISM.

Table feeds, their range, number of changes and ease with which the changes from one feed to another can be made, together with the power of the feeding mechanism, are next in importance to the spindle power and range of spindle speeds in determining the efficiency of milling machines. In the improved variable feeding mechanism with which all the universal milling machines and corresponding sizes of plain milling machines built by the Brown & Sharpe Mfg. Co., of Providence, R. I., are now equipped (excepting the No. 1 universal milling machine) these features have been carefully studied to meet the requirements of modern milling. It has been recently patented but has been in use for some time. The mechanism is positive and gives a wide range of commercial feeds, in geometrical progression, advancing uniformly from the finest to the coarsest. This arrangement of the feeds is recognized by leading engineers and mechanics as insuring the greatest efficiency and most economical operation of the milling machine. The feeding mechanism is new in design and embodies features that greatly increase the output of the machine. Simplicity is readily appreciated by all users of milling machines. The ease and quickness with which the feed changes can be made enable the operator to more readily take advantage of correct feeds for the various cuts. For example: In taking a roughing cut advantage can be taken of

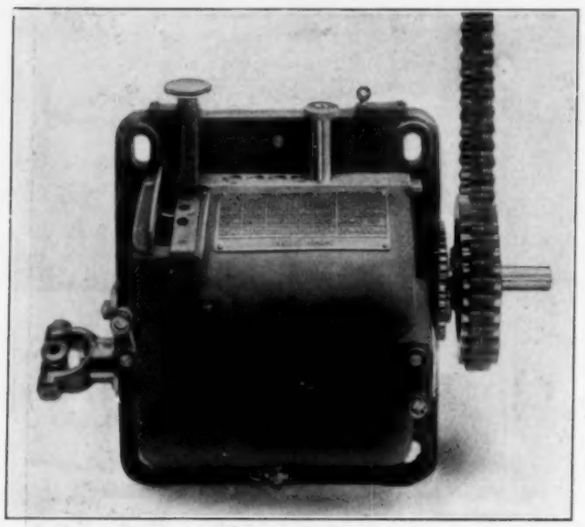


FIG. 1.—VARIABLE FEED BOX.

a coarse feed and, in the finishing cut on the same piece, a finer feed can be readily obtained.

The mechanism is driven direct from the main spindle of the machine by a chain and sprocket wheel, which gives a uniform and positive drive. The gearing is all spur gears compactly arranged in a case attached to the side of the machine, and the construction is such that the loss of power by friction is slight and the efficiency unusually great.

The feed changes are easily and quickly obtained by the simple adjustment of a lever and sliding knob, conveniently placed on the feed case. There are no loose change gears. To change the feed it is only necessary to move the lever (shown at the left of Fig. 1) down as far as possible and slide the knob along until it is opposite the column in the feed table containing the required feed. The lever is then moved up as far as it will go; the locking pin will drop into the correct hole and the mechanism is set for the required feed. Two levers on the front of the case give two slow and two fast series of feeds. The position of the levers for the various feeds is plainly indicated by the feed table attached to the front of the feed case.

In using cutters of large diameters, the slower spindle speeds are ordinarily used and a coarse feed per revolution of spindle is required to obtain the commercially correct table travel in inches per minute. The spindle speeds are also in geometrical progression, the speed decreasing by a constant ratio. It follows, therefore, that feeds must increase by the same ratio to insure the same table travel.

The Contract or "New England" System of Shop Work.

The report of far-reaching reforms that comes from the English steel manufacturing center of Sheffield has a phase of special interest to American shop managers, particularly to those who had experience under the old contract system. How far the innovation is to penetrate is not disclosed, but there is no doubt that much straightening of paths and clearing of debris is in prospect, judging from the information slowly rising to the surface in foreign journals. Claims are made that the serious competition met by firms in most important departments can only be met successfully by a substantial reduction in the cost of output. Companies that have for years enjoyed exclusive rights in the manufacture of munitions of war do not believe that the British Government will continue to be the same profitable customer as heretofore. Purchases will be made in the open market and it is probable that under the growth of peace sentiment the volume will be lessened.

Prestige and monopoly are not suggestive of industrial

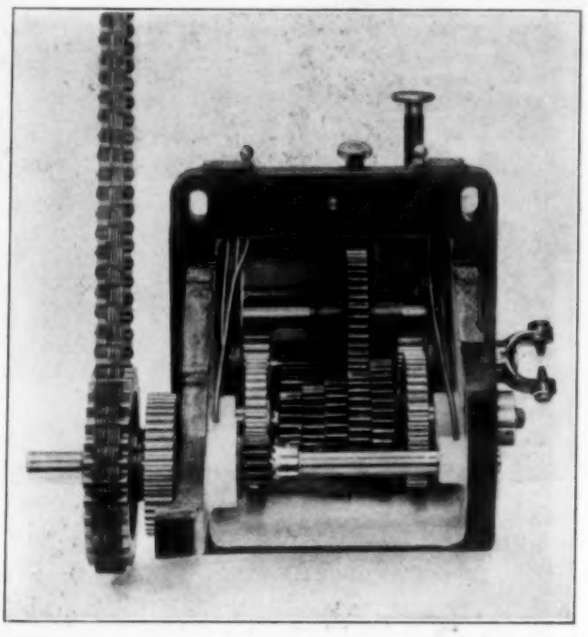


FIG. 2.—INTERIOR VIEW OF VARIABLE FEED BOX.

economy. They do not prevent economical manufacture, but plants, like the individuals behind them, borrow many characteristics that without a spur fail lamentably. The keen watchfulness of economical management may then run rapidly to seed and firmly established practice represses the personal initiative which has nothing to gain by any effort at improvement. It is asserted that wasteful practice has grown in the shops and "traditions have been established which are anachronisms in this severely competitive age." This is not the assertion of a sanguine invader of Britain, but the editorial utterance of a London trade journal.

We are told, moreover, that the managers of the works engaged in the manufacture of war material at Sheffield do not intend to effect economies at the expense of the workmen employed there. On the contrary, the employes, it is hoped, will be better off than before.

Two things at least are proposed. Useless but well paid official positions are to be dispensed with and the contracting system is to be abolished. Little need be said about the first item, which would appear to meet the views of every one save the few displaced to find support upon a lower level. The other matter is provocative of study. The contract system has been in vogue in this country and was perhaps imported "duty free" from Sheffield in the earlier days of New England thrift. Certainly the contract system is known to many as the "New England system." It is simply the agreement of a workman to make a certain article for his employer. The one offers a bid, contracts are exchanged covering the time and quantity, and

the workman proceeds to make much or little according to his ingenuity and perseverance in making terms and living up to them. Money has been made by the arrangement for both parties and some notable examples are to be found of men who have assumed the burden of a contract and found it the foundation of a factory of their own.

Philip Corbin as a Contractor.

The rise of the firm of P. & F. Corbin, of New Britain, Conn., is a case in point. The following graphic account of the application of the elder Corbin to the line of work he made a life study, is given in the memorial volume just issued by the firm, and incidentally describes the contracting system in the forties: "In the North & Stanley shops there was a lockmaker by the name of Bucknell, who was in the habit of working in the evening, getting everything ready for his men to begin in the morning without loss of time. Philip Corbin, anxious to learn, frequently spent the evening in the old gentleman's department, helping him in his work. Mr. Bucknell, finding Philip's services of value, offered to pay him for what he did, but Philip declined to take money, saying that if he could learn to make locks he would feel repaid. Finding him thus eager to learn, Mr. Bucknell took pains to teach him, and in sixty days he not only could make a good lock, but in his association with Mr. Bucknell had undoubtedly unconsciously absorbed a knowledge of the management of the workmen necessary to produce the best results. By this time the season for the letting of new contracts was near at hand and Mr. Bucknell suggested that Philip make a bid and endeavor to secure a contract for himself. To this Philip objected, saying that North & Stanley knew nothing of his ability as a lockmaker and would not give a contract to him, a 'green country boy,' as he put it. 'Put in your bid,' said Mr. Bucknell, 'and when they come to you just refer them to me.' So it was decided that Philip should enter a bid for a contract to make plate locks—a lock set into a wooden case or back cut out to receive it." The project prospered and before he was 21 years old he had 19 men in his employ.

Lucrative Returns in Sheffield Works.

An ingenious contractor was capable of doing very well, and the conditions prevailing abroad, particularly among manufacturers of war material, seem to have been profitable to the workmen in charge of their associates. It is asserted that although chosen from the ranks "many of the contractors in the great Sheffield works have quickly amassed substantial fortunes, and a few years ago, when business was prosperous, armor plate contractors often earned more than the managing director of the firm employing them." Under the new system this is to be entirely changed and it is asserted that the large sums previously paid to contractors will remain in the hands of the firms and enable them to sell steel more nearly approximating those of their foreign competitors, and the workmen, instead of being servants of the sub-contractors, will be employed directly by the firm and receive fixed instead of piece rate wages. Foremen will take the place of the contractors, but it is not likely that they will equal those keen-eyed enthusiasts for results, and later reports will only determine how far the day wage will meet the needs of the case.

The System in the United States.

The contracting system has receded from view during the past twenty-five years in this country, and with few exceptions has given place to other systems of wage payment. The writer has made some inquiry in regard to the weakness or strength of the older method. One manager of experience says: "It seems as though it presents the opportunity for a man to abuse the other men and the facilities of the shop in accomplishing a purpose. A direct dealing between the man and the employer without the interference of a middle contractor is far more advantageous to general results than the employment of such a middle contractor—a decision that has been reached very largely in this section of the country. Whenever we give out piece work it is done now directly by the foremen who have no direct monetary interest in the result more than to see that their department is well managed."

Another manager of a machine tool making firm in the same section of the country (New England) writes as follows: "The system formerly so common in New England of contracting work out to various ambitious and proven superior foremen, and of their dealing with the men, has to a large extent disappeared, though the practice still maintains to some degree. Different methods of treating with the men have been adopted, the so-called premium systems, piece work, day work, etc. So far as my observation and information goes the English people stultify themselves by reason of their dislike to the workmen making anything extra. What they make the employer seems to think is robbing him. They do not look to product as much as we do. The result is that the men, not having had encouragement, have combined to limit output, or have gradually drifted into that view of matters; the first consideration of the employer being the wages he would pay for any particular operation, that being arrived at by the rate per hour and the number of hours put upon the work. He has centered his thought upon this particular way of formulating his cost to which he finally adds his general expense and his profit, if any. At large the United States has taken a different view of matters and has tried to get product and a small number of hours, and has permitted incidentally (and really purposely to encourage the ambition of the workmen) a very much higher rate of wages than is paid anywhere else in the world."

This manager does not, however, quite agree with the case suggested above for the abandonment of the contract system, and says: "So far as the abuse of machinery goes, that may have been one reason for dropping the contract system, but I do not think it a consistent one, as with a properly drawn contract the contractor could be required to keep the tools in good condition to the satisfaction of the company; and further it would be apparent that if he let his machinery run down he could not obtain as good results after a comparatively short time."

Exceptional Earnings an Objection.

C. D. Rice, superintendent of the Underwood Typewriter Co.'s plant, at Hartford, Conn., writes as follows:

"With regard to the success of several plans for dealing with this question, and duly considering all that can be said in support of each, it practically revolves itself into the question of how skillful the management of any given case may be in dealing with matters which require so much skill and tact. In order to energize a force of men, be it large or small, a condition of general contentment must prevail, and the writer has found that any system handled so as to admit even an occasional employe to make very high wages and out of all proportion to what he really earns, is very apt to make others dissatisfied with their lot, even though they are well paid for what they actually do. There can be no doubt that a system which fairly compensates a person for extra effort and for putting unusual thought to his work in order to accomplish a large and high grade production, is the right basis to act on; but the price plan should be so arranged as to be subject to readjustment at times when sufficient gains in the matter of speed, due to greater experience or improved tools or both, have made it reasonable to do so. In cases where it is known that the operator has put forth extraordinary endeavor, a fair allowance beyond the ordinary day rate should be reckoned with. The above appertains to the individual."

"As to the question of giving contracts to the heads of departments, this plan appears to the writer to be wrong in principle, as the head of each department in a factory should certainly represent the interests of the company, and the plan of compensating them for good and loyal service and in a reasonably liberal manner, yet on the fixed day basis, seems to be the best plan. Under proper treatment on the part of the company they will not only aim to deal fairly with employes on their part, which promotes general contentment, but will at the same time with skill and tact gradually reduce the costs, and which is the chief object sought for after quality is considered. It would, therefore, appear that a piece price system in some form coupled with intelligent leadership, a plan which in the long run will prove to be superior to all other ideas on this subject, and that a reasonably fair standard of wages on the day basis together with fair treatment otherwise, will secure for a concern the ideal class of work-

men, the class which would give little if any trouble under such treatment."

Advantages and Disadvantages.

Another manager, who has had experience with large plants here and abroad, sums up his impressions of the contract system in the following:

"Contracting on coarse work is an easy method for the employer, but it is fatal where exactness is absolutely essential. After all, there is a lazy way and a brainy way of manufacturing. Today the employer wants to be in the thick of it, and I think the results justify his keen interest in his own business.

"The advantages of the system of contracting and sub-contracting may be described as follows: Employer knows exactly what product will cost. The total output in a given time is greater than an ordinary day rate system. The employer is relieved from all responsibility and worry regarding the appointment and control of foremen and force. The contractors and their sub-contractors get a field for exertion not open to ordinary foremen, and work hard, usually for a handsome return. The contractors and sub-contractors exercise their ability keenly to secure labor-saving methods. As an experimental method, contracting helps employers to measure up the possibilities of the workmen.

"The disadvantages will counteract the former for the following reasons: The cost of the product is fixed by parties having no interest in the investment and the employer is out of touch with the details of running his own works. While quantity is secured, it is got out by people who have no pecuniary stake in the quality, and poor work often slips through. In fine mechanisms this is injurious to the firm in the long run; also slow day work is no longer the *only* alternative to contracting piece work, and both with premium and daily task work, duly inspected under foremen, the quantity is at least equaled and the quality maintained. It is not desirable that a works should be administered by a set of contractors, as they are apt to run things to the ground and take no broad equitable view of the maintenance of the company's plant. The lot of the ordinary workman under contracting is not a happy one, and where sub-contractors are also used it is apt to reach the stage of oppression, while the employer has his hands tied and cannot interfere. The individual artisan has his ambition and inventiveness greatly restricted by the greed of the contractors, and the employer is apt to have a disgruntled force which costs him in the long run as much as a contented one, provided he enters with spirit and intelligence into his own business on modern lines. The individual workman, not the contractor, is the true industrial unit and the scientific time study of his best performance with the greatest facilities which the brains of the business can supply, is the truest measure of the worth of high wages and couples up the mutual interests of all."

Contract System at Baldwin Locomotive Works.

The most representative plant employing the contract system in this country is the Baldwin Locomotive Works at Philadelphia, and Messrs. Burnham, Williams & Co. have briefly outlined the method of wage payment there in vogue. A portion of their letter is submitted below, and the point of view will doubtless be of quite general interest:

"We see no objection to the contract system, provided the superintendent and foremen protect the workmen from the avarice of the contractors. The exigencies of competition and the desire to produce work at a minimum cost should prevent the contractors from making excessive profits out of their employers.

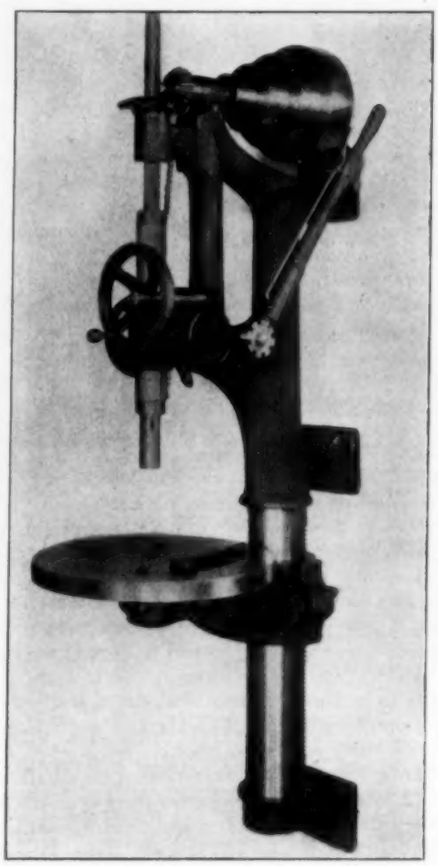
"In our own works we employ the contract system referred to, but all employes whether working directly for us or working for sub-contractors have their rates of wages fixed by us and receive their compensation directly from us, thus avoiding the abuses referred to. We have found this system to work well, and we therefore conclude that the trouble is not with the system but with its abuse. The same might be said of any other system of managing men and controlling in a positive manner the cost of the job, or the cost of the work manufactured.

"In many branches of the iron industry there is a necessity for individual piece work, and this can with advantage be combined with the contract system in order to obtain the best results."

A NEW WALL OR POST DRILL.

Boynton & Plummer, of Worcester, Mass., have a new and improved type of drill press designed for fastening to the wall or any convenient post or column. The drill frame is attached to column or wall by the brackets, which are cast on the upright, and the machine therefore takes up much less room than the ordinary floor drill and yet has all the features of that useful tool. The machine has a swing of 24 inches and the spindle is counterbalanced by a weight in the column and has a vertical traverse of 11½ inches. The spindle nose is fitted with a No. 3 Morse taper socket. The table has a vertical movement of 18 inches, making the greatest distance between the spindle and the table 24 inches and allowing work of large dimensions to be handled.

The drill press is equipped with both lever and screw feed and these can be easily changed from one to the other by a small lever which throws the feed worm in or out of mesh with the worm gear. The lever is arranged with a notched ratchet by which the entire traverse of the spindle may be



A NEW DRILL PRESS.

operated with the lever always at a convenient position. The table is worked by rack and pinion and can be swung around the upright at any angle.

The drill has a four-step cone pulley of the following dimensions: 11, 8¾, 6¼ and 4 inches for a 2¾-inch belt and is equipped with countershaft to match. There are 10-inch driving pulleys on the countershaft for a 3-inch belt and these should be run at 230 r. p. m. The entire length of the drill press is 72 inches and the total weight 610 pounds.

The High Speed Tool Co., recently organized at Toledo, O., will establish a plant for the manufacture of cutters, drills and reamers. E. R. Davis, formerly a representative of a steel concern at Sheffield, England, will be general manager.

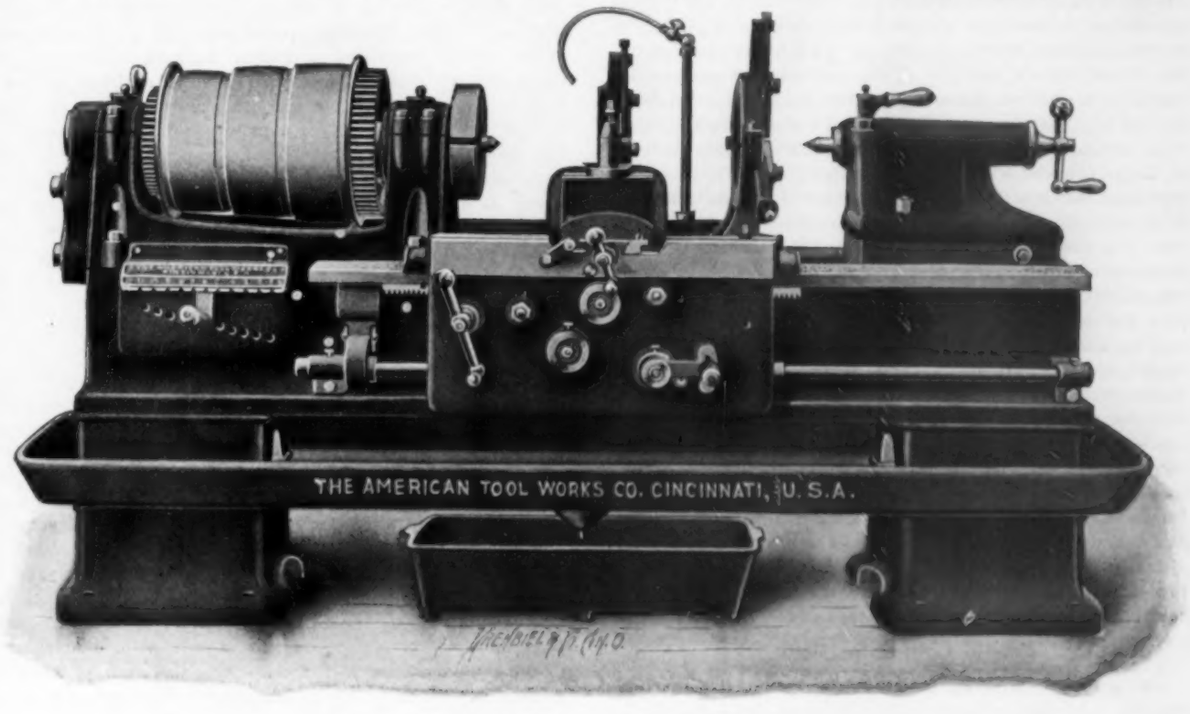
The Inter-State Bridge Co., Kansas City, Mo., recently incorporated, succeeds the partnership which has carried on the business for several years.

A NEW HIGH SPEED LATHE.

The illustration shows the latest tool of the American Tool Works Co., of Cincinnati. This machine is the new high speed manufacturing lathe, and is particularly efficient in turning up shafts of small diameters. It is given an unusual amount of strength to adapt it to the heavy requirements manufacturers demand from a tool of this character. The bed is made extra deep and wide, and is supported by substantial cabinet legs. The apron and carriage are given unusual strength and the apron is geared with longitudinal and cross-feed friction. The patent drop V pattern of the bed makes it possible to place a great deal of metal in the bridge of the carriage, usually a weak place in a lathe. The headstock is made extremely rigid, and is equipped with a three-step cone of large diameter, for four-inch double belt. This gives the lathe such an amount of belt power that the contact of belt when on the smallest step of the cone, is greater than on the ordinary 36-inch lathe. The lathe being intended primarily for working at very high spindle speeds, the bearings are of ample size, made of phosphor bronze, and scraped to a perfect fit.

In the lathe as illustrated the entire screw cutting mechanism is omitted, because of the character of the customer's work. This mechanism of course can be included when desired, and is similar to that incorporated in the regular lathe of this make, with a range of forty-four changes immediately available while the machine is in full operation without removal of a single gear. The lead screw is located on the inside of the bed, directly under the cutting tool, an arrangement which centralizes the strain and obviates the twisting tendency common in lathes where the screw is on the outside pulling through the apron. This lathe can also be equipped, as shown, with a means of constant and effectual oil supply to the cutting tool, together with a large pan of symmetrical appearance for catching oil and chips.

This lathe is at present built in the one size with an actual swing of 20 inches and some remarkable tests have recently been made on it.



A NEW 20-INCH MANUFACTURING LATHE.

The National Electric Co., successor to the Christensen Engineering Co., Milwaukee, Wis., has moved its executive offices and enginering department into its new building, which is three stories, 200 x 66½ feet. The company has provided dining rooms and will serve luncheon at noon daily to the employes of the executive office and the engineering department free of cost.

PRICES OF STANDARD AND LIGHT SECTION RAILS.

A correspondent calls attention to the disparity between prices of standard section steel rails, which are held by the rail pool at a uniform price of $28 per ton, and the prices of light section rails which, since the drop in prices of iron and steel products last year, have been sold at an average price of about $23 per ton at Pittsburg. Thus the light rail is sold for about $5 per ton less than the standard rail, notwithstanding the fact that it costs the rolling mill several dollars a ton more to roll the lighter sections. Our correspondent suggests that one cause of this disparity is that the mills are making use of the rerolling system and are rerolling rejected standard section rails and odds and ends of billets into light sections. It seems probable, however, that the chief reason of the disparity in price is a commercial one. There are, comparatively speaking, very few steel rail mills capable of producing standard section rails and these are controlled by a much smaller number of companies. The maintenance of a price on these rails is, therefore, comparatively easy. The mills capable of rolling light section rails, on the other hand, are quite numerous, and an effective combination between them would be difficult. More important still, the volume of business done in light rails is very closely dependent on the price at which they can be sold. These rails are used for contractors' work, logging roads, industrial railways, short spur lines and similar locations where speeds are low and the matter of safety does not enter. In many cases the use of second-hand rails is an alternative, and one which will be taken advantage of if the price of new rails goes up. This fact is fully understood by steel rail makers, and is doubtless one reason why the maintenance of a pool price on this class of steel products is not attempted.—[Engineering News.

The Simonetta File Co., Detroit, Mich., tendered a reception to its stockholders a few days ago. Rudolfo Simonetta, the president of the company, presided and introduced his father, Vincenzo Simonetta, to the guests. The elder Simonetta is operating a plant for the manufacture of files at Turin, Italy, and brought with him a case of medals awarded him for his files. Rudolfo Simonetta stated the company would use a steel which would cost 15 cents per pound. He said the company could do this and still undersell imported files, which are compelled to pay a duty of 50 percent. Among the stockholders present were: H. J. Boerth, E. F. Berry, Eugene C. Whitney and Darwin Curtiss.

Motor Driven Machine Tools.

BY H. M. PHILLIPS.

The manager who does not wish to fall far behind the times must give considerable thought to electricity as a motive power for his tools. If his shop is an old one it is extremely probable that there will be a decided advantage in substituting motors for at least part of his shafting and the changing over of the entire plant is worthy of consideration if not of immediate execution. Though he may wish to install but a small amount of electric power at first he should remember that it is very likely that he will wish to increase the amount in the future and should make such provision as he can for extending the system. When a new plant is to be built modern practice dictates that many types of tools, if not the entire plant, should be motor-driven.

All this is fully realized by the intelligent manager; but when it comes to making an actual decision as to the type of apparatus to be used and the system of wiring and speed regulation to be followed he will be confronted by many difficulties. It is probable that in time experience will show which method is best suited for almost any case and there will then be little more difficulty in deciding on the proper installation of electrical equipment than there is at present in regard to a steam plant and shafting. That happy time has not yet arrived, and the manager or engineer must choose between a number of systems that are quite different in their operation and on which it is very difficult to get sufficient reliable data to be sure of getting the best equipment for the particular case he has to consider. Electrical apparatus is in all cases rather expensive, but it will be found that there is a wide difference in the first cost of installing the different systems in common use. For some purposes there can be no doubt that the simplest and cheapest system will give the best service; in others the conditions render it almost equally certain that a complex and costly system should be installed. There are intermediate cases with systems to fit which can be decided with regard to their mechanical and electrical merits only. If money were no object, the selection of the system would be considerably simplified. Very few will wish to spend money for which there will not be an adequate return, either through increased efficiency of the shop as a whole or, which amounts to nearly the same thing, greater reliability of service and a smaller expenditure for power, attendance and repairs. Very few will contend that it pays to buy cheap apparatus, though special cases may justify it. The difference in cost referred to is that between different systems of installation and speed control, the best apparatus being used in each case.

How to Connect the Motor.

One troublesome problem lies in the method of attaching the motor to direct-driven tools. In many cases it will tax the ingenuity of the engineer to connect the motor to a machine already in place and arranged for a belt drive without making a job that will be an eye-sore. In purchasing a new machine this responsibility can be thrown on the builder and he has rather better opportunities as he can modify the design of his machine to some extent to meet the new conditions. The result, however, is seldom all that might be desired, for he can not make an entirely new design without an expense that would be prohibitory for a small number of machines, and the chances are that the next purchaser will want the machine fitted with a motor of entirely different type and size, thus rendering his first design and patterns of little use. Aside from this the designer finds it difficult to discard the ideas to which he has always worked on belt-driven machinery, and even if he succeeds in so doing he can hardly hope to arrive at a result equal in all respects to those that have been obtained through years of development in the older types. The result is that a direct-connected motor is seldom pleasing to the eye. This may be partly because we are unaccustomed to it. Many will remember the clumsy appearance of the first pneumatic-tired bicycles.

In considering the direct connection of machine tools to electric motors the first question that arises is the amount of actual benefit that will result. Will it pay for the installation? There is no doubt that in all ordinary cases the electrical equipment will be far more expensive to install than shafts and belting, and the engineer will do well to make approximate estimates of the cost of the electrical systems he wishes to consider and of a first class shafting system. There is no doubt that the electric drive has proved highly satisfactory in nearly all cases where it has been adopted, and a greatly increased output has been the result in many cases. It would be very hard to prophesy the exact gain in any particular case unless it can be compared with almost exactly similar ones with and without the electric drive. There are, however, certain advantages which probably result wherever electricity is employed, and by considering each separately some idea may be obtained of the benefit that will result in the particular case under consideration.

Relative Efficiency of Motor and Shafting.

A few years ago, when little had been done in this line, the saving of power effected by the motor was shown that in strongest point in its favor; experience has shown that in nearly all cases there is a saving, but that it is not necessarily large and that in most cases it is the least of the advantages that may be expected to be derived from its use. The efficiency of the shafting and belting in an ordinary machine shop or factory, as obtained by a comparison of indicator cards taken from the engine when the plant is running under normal conditions and after working hours with all the machinery shut down, may be taken as about 50 percent; it is somewhat higher in a few cases and a good deal lower in others. The efficiency of a motor running at or near its full load may be taken at about 85 percent, and when a direct-connected machine is shut down the motor takes no power at all. A very attractive saving in fuel can be figured on this basis, especially where coal is high, and even in regions of cheap fuel the price is gradually advancing and manufacturers will soon have to be more careful of their coal consumption than most of them are at present. These figures, however, favor the motor more than is strictly just. In many cases motors will have to be run a large part of the time at a good deal less than their full load and their efficiency will be considerably reduced in consequence. We may admit that the efficiency of the shafting in the "average shop" is 50 percent, though it seems rather a low value and in some cases it is likely that the engine friction is not deducted from the value of the cards when the comparison is made; this might affect the total efficiency by several percent, and will, of course, be with us when the electric drive is used. Aside from this the shafting in the average shop is poorly installed and poorly cared for; it is more or less out of line and the bearings consume an undue amount of power. It is hardly fair to compare such a case with an expensive motor equipment, for at much less cost the shafting could be arranged to the very best advantage, self-oiling or roller bearings could be installed in place of those in common use and the shafts could be kept accurately lined up for a good many years. It would seem likely that the average efficiency might be increased as much as 25 percent by this means alone. It is not safe to assume that because the average efficiency is 50 percent this will be the value for any particular case; if all of the values came near the average it would be a much safer basis to go on, but they vary greatly, not only with the condition of the shafting but with the nature of the machines that are driven. Small machines and those that take but little power to drive, of course, require a comparatively large amount of power for the shafting, while those consuming a large amount of power, especially if running at high speeds, will show a much better result. The arrangement of the buildings and machinery also makes a great difference in the loss in the shafting; extremely long shafts, mule pulleys, quarter turn belts, etc., waste a large amount of power. It is safe to say that if power saving were the only consideration there would be comparatively few motors installed, and then only where power was to be transmitted to a greater distance than is required in most manufacturing plants.

Motors and Arrangement of Buildings.

The freedom allowed for the best arrangement of buildings and machinery, with little regard to the question of power transmission, is sometimes a decided advantage where electric power is employed. To design a large manufacturing

plant in which the entire power transmission is to be by means of belts and shafting entails many difficulties. The question of economical power transmission must be always in mind. The engine should be centrally located; all shafts should be parallel; very long shafts or long belt drives should be avoided; due provision for supporting the shafting should not be neglected. The location of machines must be governed to some extent by the best location of the shafting. Of course there are many other considerations in regard to the location of buildings and processes of manufacture that will conflict with the above, and a compromise must be made, resulting either in poor power transmission or an arrangement that is undesirable in other respects. Although the question of transmission with electric power should not be entirely ignored, it is so simple that is need cause no trouble. When nothing else is sacrificed by so doing it is well to have the power plant centrally located and to make the distance power is to be transmitted as short as possible. If it is desirable to make the distances considerable it only means a greater first cost of wiring. The transmission can still be satisfactorily arranged. The ease with which the location of machinery may be changed is worthy of consideration in almost any plant, while some manufacturers of very heavy machinery find that special tools can easily be brought up to the work when it would be almost impossible to bring the work to the machine tool.

The absence of all or of the greater part of the overhead shafting will be of advantage in nearly every case and will generally result in a greater saving than might at first be supposed. The light is greatly improved, not only on account of the free space allowed but also because the walls and ceilings can generally be kept clean with little trouble, while it is almost impossible to do so when there is a network of shafts and belts throwing oil and dirt about and interfering with the work of cleaning. An improvement in the lighting of the shop will very frequently make a surprisingly great difference in both the quantity and the quality of the output. It is also much easier to handle the work when there are no belts to interfere; when the work is heavy, cranes or trolleys can be run to any desired point and much time and labor saved; even when the work is light it is difficult to handle a piece of any length when the shop is full of belting. The difficulty is hardly realized until it is removed, for it is more of a question of time lost in dodging belts than of actual labor.

Advantages to the Workman.

The greatest advantage of all often results from the workman having easy and positive control of the speed of his machine at all times. The belt is a constant source of trouble on most machines that are equipped with stepped pulleys for changing the speed. As soon as a heavy load is applied the belt begins to slip. The machinist must either stop and tighten it or, which is more likely, he will use a light cut when he should be using a heavy one, and save trouble with the belt by wasting a great deal of time on his work. When the belt is tight enough to do all the work required of it there is difficulty in shifting it from one speed to another; time is lost in so doing, or frequently the operator will continue with one speed when considerable time might be saved by a change. With the belt-driven machine there are comparatively few speed changes available, and in nearly every case work must be stopped while changing from one to another. A much greater number are available with the motor drive and work need not be stopped in making a change. An example will illustrate the saving that may be effected in some cases: A man is to face off a large disc on a lathe or boring mill. He starts at the outside with a cutting speed as high as is allowable at that point. When he has cut half way into the center the speed of the machine might be doubled without injury to the tool, and when he has gone three-quarters of the distance the speed might be doubled again. Unless the piece is quite large the man with a belt-driven tool will not change his speed at all. It is considerable trouble to do so and in any event he will lose time in making the change; perhaps as much as would be saved by the increased speed. The man with the motor-driven tool can increase the speed almost constantly and with practically no effort, keeping up the proper cutting speed at all times. This would mean that the work would be done in approximately half the time that would be required with no speed changes.

Another interesting case occurs when but a small portion of the circumference of a large piece is to be turned. As soon as the tool leaves the cut the operator of the motor-driven tool may greatly increase the speed and maintain it till the tool is nearly up to the cut again, saving much time in this manner. A somewhat similar case arises when there is a hard spot in a casting that will injure the tool unless a slow speed is used. The speed may be checked just as the spot approaches the tool and brought up to full cutting speed again as soon as it is passed. Of course these cases are not of very frequent occurrence in the ordinary shop, but there is almost invariably a large increase of output where the electric drive is used. Fully 25 percent is claimed in many cases. The great improvement in special tool steels during the past few years has given the motor a still greater advantage over the belt. It is more difficult than ever to avoid the trouble of slipping belts, and increasing the weight of the belts makes them still more difficult to shift from one speed to another. The expense of keeping belts and shafting in order is also a considerable item.

The Group Plan.

Not long ago some enthusiastic engineers were in favor of running every machine tool by a direct-connected motor, but it is now generally conceded that it is better to run small machines in groups connected to a short length of shafting driven by a motor. It seems at first that by so doing most of the advantages of the motor drive are lost, but this need not be the case when the machines are properly arranged. The belt trouble is not nearly as serious with small machines as with large ones, and the machines can generally be arranged so that the short lengths of shafting are not in the way. Numerous spaces can be left for trolleys, etc. By grouping the machines so that all of those on the same shaft will be in use or shut down at the same time a considerable saving in power will be effected. When proper care is used in arranging the machines the saving of power by this method will be as great or greater than by the use of individual motors. The motor on the shaft may run at pretty nearly its full load most of the time, while individual motors have to run a good deal of the time on light load and low efficiency in order to be able to meet the maximum requirement of the machine. The very small motor is also of lower efficiency and more expensive in proportion to its horsepower than one of medium size. It is also more likely to need frequent repairs. The horsepower of a motor is generally about in proportion to its speed, and therefore the variable speed motor must as a rule be heavier than would be required where the motor is run at constant speed and the changes made by a belt. The controller is also expensive. It may equal the cost of the motor for small machines while the constant speed motor requires no controller. The method of grouping small machines on a shaft is therefore very much cheaper to install and gives as good if not better results than the use of individual motors. The number of machines to be used in a group and the limiting size of the machine to which a separate motor should be assigned will, of course, depend upon the nature of the work and the expense that is justified by the advantages of an independent drive. Except in special cases motors of less than 1½ h. p. are not advisable.

The Question of Speed Regulation.

The amount of speed regulation required is the principal factor in determining the system to be installed and the cost of the same. The advantages of a wide range have already been mentioned, but in order to save money no greater variation should be asked for than is actually needed. It is possible to obtain all that can reasonably be asked, but it has a price. A large number of intermediate speeds can be obtained without much expense, the variation between maximum and minimum being the controlling factor. In buying a lathe a standard machine is nearly always the one required. It has a pretty wide range of speed; and although but few

speeds may be required for the work it is to do in a particular case, no one would think of getting a special machine with the extra speeds left off, as it would probably cost more than the standard. When a motor is to be attached it would be poor economy to go to a large additional expense to obtain speeds that would never be used. On a large lathe the higher speeds would only be used for a cut that runs nearly to the center, for filing and polishing the work or for turning wood or brass. In many cases these operations are never required, and such speeds need not be provided for on the motor. In many cases one or two of the lower speeds may also be eliminated with considerable saving in the cost. Where the wide variations are very seldom required it may be better to accomplish them by means of change gears than to go to the greater expense of providing a motor to cover the entire range. A lathe used on general work is quite likely to require the maximum horsepower at its lowest speed, for although the linear speed of the cut may be supposed to be the same on pieces of different size, it is generally the largest pieces that require the heaviest cuts and from which the most metal must be removed. The size of the motor is usually determined by the horsepower it must furnish at its lowest speed; and although this amount may be nearly doubled when the speed of the motor is doubled it will of no benefit in the case in hand, as the lathe will probably require less power at the higher speed. When the entire speed variation of the lathe is obtained through the motor the latter must necessarily run at rather a low speed at times, but if a change gear is introduced giving a variation of two to one the minimum speed of the motor may be doubled and a motor used that would have given only half the required horsepower at the lower speed. Possibly a cheaper system of control may also be used. The reduced cost may more than compensate for the inconvenience of the gears if the latter are seldom used.

The relative advantages of three different types of motors vary with the location in which they are used. It is difficult to injure the "inclosed" motor except by an overload; the case is practically airtight, no dust or chips of metal can enter and no ordinary blows received from moving stock or minor accidents will cause damage. It can be attached to a horizontal, vertical or overhead support with almost equal facility. On the other hand it is somewhat heavier and more expensive than the other types which allow air to circulate through them and carry off the heat. It cannot be inspected without removing cover plates and is somewhat difficult to clean. The semi-inclosed type is similar to the inclosed with the cover plates removed, and the air circulation allows considerably more power to be obtained from the same size of machine without overheating. It is fairly well protected from accidental blows and if the commutator or brushes are in bad condition the sparking will attract immediate attention. The air circulation causes dust to collect in the casing and about the windings and the motor is as a rule rather difficult to clean. The open type is readily inspected at any time and is easily cleaned; the air circulation is also excellent; but as a rule the motor must be supported on a horizontal base and if in an exposed position may be damaged by pieces of metal coming in contact with its windings or commutator.

Methods of Changing Speed.

The system of controlling the speed by varying the strength of the current in the field winding of the motor and maintaining a constant voltage at the armature has many advantages and is without doubt the best when only a comparatively small amount of speed variation is required. The motor may be run on any direct current constant potential system. No special motor is required. The controller can be attached to any shunt or compound wound motor without difficulty; the wiring is simple and inexpensive; the controller is cheap, simple, of high efficiency and not at all likely to get out of order. The system is an exception to the general rule inasmuch as there is a decrease in the available horsepower with increasing speeds. The exact range of speed variation obtainable will vary with the type and make of machine. For the ordinary open type machine it is small, seldom over 10 or 15 percent with the machine fully loaded, but can be increased as the load diminishes. The possible increase of speed will vary about inversely as the speed of the motor up to the maximum speed at which it is safe to run, the entire variation being obtained by increasing the rated speed of the motor. The inclosed type of motor will generally allow a considerably greater increase of speed under full load than the open, but merely because if ventilation were allowed the full load of the motor would be rated at a higher figure; in a sense it may be said that the inclosed motor has a lower rating than a similar one of open type. Specially designed machines may give a still wider range. One company at least advertises an inclosed motor with which an increase of speed of 100 percent may be obtained without affecting the horsepower. As has already been mentioned, the full horsepower is not always required for the higher speeds, and where this is the case the effective range of the motor is increased; a more powerful motor than is needed at the low speed will also allow a greater variation.

The speed of any motor can be reduced below the normal by the introduction of resistance in its armature circuit. This is the means almost universally employed to bring the motor gradually up to speed in starting, but as a means of regulation its simplicity is about the only point in its favor. The electrical efficiency is very low, any reduction of speed being a proportional amount of power wasted. When a motor is run at half speed by this method it can deliver but half its rated horsepower, but in doing so will consume the same amount of current as when running at full speed and power. For some purposes an even more serious objection to this method lies in the fact that the speed will vary with the load unless a corresponding change is made on the regulator. If the motor is running at half speed while taking a heavy cut on the lathe it will run up to nearly full speed when the tool is removed from the cut unless the regulator is quickly adjusted. On the other hand when the motor is running at half speed with no load and a heavy cut is started, the speed will be greatly reduced or the motor may come to a standstill unless the regulator is adjusted to meet the load. The regulating resistance is also rather bulky and expensive when much regulation is required on a motor of any considerable size. When the amount of regulation desired by this system is small all of the above faults are correspondingly diminished and it may be used to advantage in connection with the system first described or with others to obtain slight speed changes.

A special motor may be used which has two commutators and two separate armature windings. When such a motor is used it is possible to obtain three fundamental speeds by changing the connections between the main line and the motor. The relative values of these speeds will depend upon the winding. In order to have the percentage of increase the same at each step the ratios must be 1, 1.6, 2.6, or about 62 percent at each step. Other ratios will result in an irregular increase, for example, 1, 1.5, 3, or 1, 1.4, 3.5, which may be preferable in some cases. By this means alone the close adjustment of speed that is required in many cases could not be obtained, and moreover the sudden changes would be too great a strain for the motor to carry safely. One or both of the systems previously mentioned may be used to give any required number of intermediate steps and to increase the limits of required regulation. If enough field regulation is provided to give an increase of 50 percent in the speed together with a sufficient amount of armature resistance to effect a decrease of 25 percent in place of having the previously mentioned speeds of 1, 1.6, 2.6, any desired speed between a minimum of .75 and a maximum of 3.9 can be obtained. All the different connections and the introduction of resistances will be effected in their proper order by a continuous movement of the regulator handle, which can be operated from any desired position. The motor can be installed on any direct current two-wire system, and aside from the motor, controller and the wiring between them no special apparatus or wiring is required. The motor is somewhat expensive on account of the double commutator and special winding and the controller more complicated than in the previous cases; as in all other systems a heavy motor will be required when run at a low speed.

In some cases a direct-current three-wire system, giving

The Eastern Machinery Market.

NEW YORK OFFICE OF *The Iron Trade Review*,
Room 1920, 150 Nassau Street, April 5.

The machinery market in this vicinity during March was a little more active than in January and February, but it did not require a great business in March to justify this statement, on account of the great dullness which prevailed in the first two months. A large number of machinery houses report that their business for the past four or five weeks showed no improvement over what they had done earlier in the year, but even among these there was a feeling that the machinery situation had witnessed the disappearance of many of the adverse features which had characterized it for several months past. It can be stated without hesitation that in nearly every branch of the machinery trade inquiries received last month showed a gratifying increase. But it is also true that many of them have not yet resulted in orders. Just what prevents closing is difficult to ascertain, for no two explanations seem to agree upon that point. Many look for only fair business at the best for the remainder of the year, while some of the most conservative men in the trade do not look for anything approaching activity before the advent of next spring, when they expect business to pick up so decisively as to bring about a repetition of the prosperous years which preceded 1903.

During March the machine tool trade was noteworthy for several large orders. The Niles-Bement-Pond Co. captured the most of these, chief in importance being one for 13 heavy boring mills from the General Electric Co. The other orders given the company were of good proportions also, but reticence is maintained as to details. The Power Mining & Machinery Co. also purchased the most of the $90,000 worth of machinery tools for its new plant at Cudahy, Wis., the major portion of which went to Walter W. Foster, of New York, who represents several machine tool houses in this city. Then a good number of small orders were placed, the month's totals in this connection making a much better exhibit than those of January and February. Inquiries were numerous also, and they represent more kinds of machines than last month's.

As for machine tool propositions yet to come, the "street" has more of them under consideration now than it has had in several months. The General Electric Co. is likely to be heard from any day with the purchase of a large amount. The necessary specifications are almost ready. The eyes of the trade are also on the machine tool equipment for the new shops of Henry R. Worthington, at Harrison, N. J. An officer of the International Steam Pump Co. informed your correspondent today, however, that the specifications would not be ready for from 60 to 90 days. In well informed circles it is believed that the Niles-Bement-Pond Co. will get the order for all or nearly all of the machines that will be purchased.

Railroads are beginning to show a disposition to purchase machine tools also, and the Pennsylvania, Southern railway, Erie and Baltimore & Ohio railroads are now or shortly will be in the market with some good specifications. We are officially advised that the Ingersoll-Sergeant Drill Co. will purchase no more machine tools for its new plant at Easton, Pa. The fact is the company did not need as many machines as it at first expected, and such as it did need were purchased gradually, the Niles-Bement-Pond Co. and the Browne & Sharpe Mfg. Co. getting the most of the orders.

In engines and boilers March was slightly better than its predecessor. Orders were for small horsepower for the most part, and the competition was exceedingly keen. Of propositions calling for large horsepower, there are very few in the market just now, but inquiries relating to small sized engines are quite plentiful, and this is taken to mean that general manufactures are becoming more active. In electrical machinery March was much better than February, but it was noticeable that the majority of orders came from established concerns, which were either improving or enlarging their mechanical equipment. Orders in connection with new establishments were very scarce, and this is one of the things manufacturers don't like.

At present the electrical trade is very much interested in the building industry in this city, which at this writing has a most gloomy outlook. Pending the outcome, a large number of orders for engines, boilers and electrical equipment are hung up. Some manufacturers have been able to book orders contingent on the final settlement of the strike, but the bulk of the business in sight cannot be had even under these conditions. In machinists', contractors' and engineers' supplies, March brought about some good orders, with the outlook regarded as even more promising.

The export machinery trade for the month was practically unchanged. The orders placed were of an insignificant character, and some machine tool manufacturers who entertained high hopes in this direction at the opening of the year, do not speak as optimistically now. There are reports here that Cincinnati manufacturers have booked some excellent export business recently, the Bradford Machine Tool Co. being credited with particular good fortune in this respect.

As regards the general machinery outlook, interest at present is chiefly centered in the purchases of the machinery that will be needed to build the Pennsylvania tunnel. A member of the firm of Carr Bros., of No. 32 Broadway, this city, representing S. Pierson & Son, Ltd., of London, who will build the tunnel from New York to Long Island City, said today that no specifications will be issued and no orders given for machinery until five or six weeks from now. Asked what would be the probable outlay for machinery under the Pierson contract, he stated that $1,000,000 to $1,500,000 would probably cover the amount. At the offices of the O'Rourke Engineering Construction Co. it was said that no orders had as yet been given out, and probably would not be for several weeks. It was stated that the machinery purchases would aggregate about $650,000.

The Ingersoll-Sergeant Drill Co. reports no change in its business for March as compared with the first two months of the year. Treasurer Doubleday does not look for any great activity to develop this year and believes that machinery men will only have a fair volume of orders at best in the interim. The export business of this company is fairly good.

Hill, Clarke & Co. noted a slight increase in their orders for March. Mr. Clarke, of this company, who makes his headquarters at its Boston office, is a visitor at the company's offices here. He considers that the dull times in the machine tool trade are likely to continue until next spring, when he looks for activity that will be of several years' duration.

The Prentiss Tool & Supply Co. says its March business was satisfactory, although it was mostly made up of small orders. The company finds that in business of that character the market is beginning to show more animation and believes that the trade will hear more of it later on.

W. B. Mayo, representing the Hoovens, Owen & Rentschler Co., Hamilton, O., booked a large number of orders in March, the most important being for a 600-h. p. engine, direct connected to a 400-k. w. Westinghouse generator, from the Bay Shore Terminal Co., Norfolk, Va.; a 300-h. p. engine from the Rockwood Co., New York City; a 300-h. p. engine from the Chambersburg & Gettysburg Railway Co., and three engines aggregating 300 h. p. for export to South America.

E. H. Ludeman, of the Fitchburg Steam Engine Co., has some good contracts almost closed, one of them aggregating 1,500 h. p.

The Lidgerwood Mfg. Co. notes a slight improvement in its line recently. President Lidgerwood terms it an "accident," however, and believes that the machinery business is destined to be quiet for several months, as underlying conditions at present are not satisfactory.

The branch office of the Crocker-Wheeler Co. in this city had an exceptionally good run of small orders during March. Its more important orders include the complete electrical equipment for the new building of Dominick & Haff, jewelers, in this city, amounting to $11,000, and for the complete electrical equipment for the Jersey City Printing Co., aggregating $7,000.

Thayer & Co., Inc., think the steam boiler trade has improved recently, but the majority of orders taken by manufacturers have been for small units. Large propositions are scarce.

THE IRON TRADE REVIEW

Devoted to the Machinery, Metal-Working and Foundry Trades and Iron and Steel Manufacture.

PUBLISHED EVERY THURSDAY BY

THE IRON & STEEL PRESS CO.

ROSE BUILDING, CLEVELAND, OHIO.

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JOHN A. PENTON, Vice-President.
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PITTSBURG: 429 Park Building, A. O. BACKERT, Manager.
NEW YORK: 150 Nassau St., D. C. WARREN, Manager.
THE CENTRAL WEST: R. A. EVANS. Manager.

Subscription, $3.00 per annum. To Foreign Countries, $4.00.
Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER.

APRIL 7, 1904

THE FUTURE OF EMPLOYERS' ASSOCIATIONS.

The employers' association movement has now gone far enough to warrant drawing some conclusions as to what it has done and making some predictions as to the lines which its further progress will follow. First of all let it be said that the history made in the past five or six years by associations in the metal working trades is probably one of their most valuable assets. They started with a clean sheet, with no precedents to guide them, and at considerable cost have accumulated a fund of experience that might have been years in developing under the old policy of individual wrestling with the labor problems of the shop. There is no question that the collective intelligence of employers on the issues the unions have thrust upon their attention has been better than the intelligence of individuals or of single corporations. It cannot be doubted, moreover, that the employers' association movement has brought more rapidly to a head some issues on which the unions were temporizing, adopting one policy here and another there, according as local strength or opportunity dictated. Local unions might lay down as law to a single firm acting in its individual capacity, what national officers of the same union sitting in conference with an employers' association committee would be compelled to repudiate as no part of the policy of their organization. The machinists' New York agreement of 1899 with their organized employers was a case in point. The right of the employer to hire and discharge was affirmed there, though denied over and over in local disputes. To be sure, the national declaration was afterward twisted and then nullified, but it was the employers' organization that forced the union into the open on this question, nevertheless, and that showed many employers that their confidence that they had the affairs of their shops in their own hands was only a fancied security. Similarly in the foundry trade, as soon as the molders' union found itself confronted with an organization which insisted on definite avowals of the position of the union in respect to limiting output, and in respect to the molding machine, as well as the employment of unskilled labor in the foundry, declarations were formulated on these important questions, and every foundryman thereby had his own course more clearly marked out for him.

As was plainly indicated in the discussions at the recent Philadelphia convention of the National Metal Trades Association, the organization movement among employers has now reached a point where it must be definitely directed with a view to its maximum efficiency. The growth of the past few years has been rapid but heterogeneous. The work has lacked unification, and there has been an overlapping of effort, with loss in economy. In the foundry and metal-working trades there have been the two well known national associations, and in addition in the important cities of the country, local associations bringing together not only founders and machinery builders, but brass goods manufacturers, boiler makers, structural firms, operators of forge and blacksmith shops, sheet metal works and manufacturers in allied trades. The multiplied labor troubles of over-prosperous years have brought the manufacturers in these lines together in strong local associations, which have been successful in a noteworthy degree in their resistance of unjust demands of the unions, while in cases where agreements have been made between employers' organizations and the unions, the position of the latter has been materially modified by conference and conciliation.

But the burden of expense and the demands upon the time of active members have been no small items in the multiplication of these organizations. Members of a national association embracing manufacturers in one line, as founders, or in kindred lines, as metal working and machine building companies, have found that their several years' experience in their respective national organizations make them in demand as the men to whom important questions in the locals are referred—questions that take time and involve a vast deal of hard work. In addition to the time and money called for by these associations that deal with single or allied trades, there is the National Association of Manufacturers, the American Anti-Boycott Association, in many communities the Citizens' Alliance, in important centers the Civic Federation branches—all in addition to chambers of commerce, employment bureaus and local industrial associations designed for the promotion of local industries.

It is plain that manufacturers are becoming overloaded with organizations, but equally plain that the employers' association movement has only reached a tithe of the influence it will exert when the full benefit of the experiences of the past few years has been realized. While there are some firms who have dropped out of national organizations because they believe the locals answer all their needs, and while the recent turn in the business situation may have led some to cut loose in the belief that they can get along without association help, no one who has watched the leading associations for the past few years can think for a moment that the readjustments that are about to be made will result in loss. They can mean only gain.

It may be that the local associations more and more will handle labor troubles, and combat boycotts and violence by resort to the local courts, leaving the work of making sentiment, of agitation and education, of guarding against ill-considered labor legislation, and of securing uniformity in matters of shop practice and administration, to the national bodies. But even so, the national associations, where they deal with single or allied trades, will be a powerful reinforcement of the local associations if they maintain strong reserve funds and hold themselves in readiness to throw all their weight into any struggle that involves a principle to which their membership is pledged unalterably. And where a national association represents a trade in which national relations with the union are considered advisable, the necessity for its strong maintenance, whatever the efficiency of the locals, will be more and more evident. Such an association, as exemplified in the National Founders' Association, can do a great work in bringing about uniformity in the labor conditions of its members and in modifying the extreme positions often assumed by the unions.

Perhaps the greatest benefit of the employers' association movement, as far as it has advanced, has been

the education of the employers themselves on the labor problem. Many have been content for years to let the unions go on thinking their own thoughts in their own way, and an occasional strike handled in the way suggested by the turn of events has been the employer's only season of active work on the problem. The association now keeps him thinkjng the year around. By his contact with other employers he is getting the help of some of the best brains in the country on questions that are of the most vital concern. Nothing better illustrates the results of the bending of employers' minds unitedly to the issues presented by the rapid growth of unionism, than the change that has come in public sentiment on labor questions. The arrogance and injustice of some of the claims of unionism are being challenged in many communities as never before. In the ranks of employers' association secretaries, moreover, is being developed a class of talent that presently will make itself felt as fully equal to the abiity and resourcefulness commonly found in labor union leadership.

The more they are studied the more it would appear that employers' associations are to be a permanent and potent factor in the labor problem. Any changes that may come from the present agitation for a rearrangement of lines are only a necessary evolution leading to greater vitality and effectiveness.

STEEL CORPORATION FINANCES.

The United States Steel Corporation has made good use of the two years and nine months of its existence both in strengthening the physical position of its properties and in increasing its corporate soundness as set forth by its books. The propriety of its early adjustments was so clear that their main significance was in pointing out a condition of decided unsoundness in the fiscal presentations that were being made by the individual companies. One of the United States Steel Corporation's first steps was to write off from property account some $116,000,000 which had been carried by various subsidiary companies as surplus. Following this, the depreciation and extinguishment funds and the extraordinary replacement funds, as regularly provided, together with the two special $10,000,000 funds for depreciation, improvements and construction, have been largely administered in the building of practically new plant, the actual expenditure of the money, together with the wisdom of such expenditure, being shown clearly by the detailed lists of additions to plant which are given in the annual reports.

These appropriations from net earnings in 33 months have totaled $62,000,000, either actually expended or really available, in addition to ordinary repairs and maintenance, included in manufacturing cost, of from $21,000,000 to $22,000,000 per year, and in addition to providing the necessary bond sinking funds.

The period of exceptional prosperity through which the corporation has passed has been suited to the clearing up of its fiscal position, and to the making of improvements to its properties. The first needs to be done but once, the second, in view of the period of comparative quiet into which the trade has passed, would appear not to require continuance in the immediate future on the same scale. Good work has been done and the corporation may to a certain extent rest on its oars.

The position of the steel corporation as to its bond and stock obligations is now materially different from what it was. The corporation's second mortgage bonds have been issued, reducing its required annual disbursements, providing through the operation of sinking funds for a large extinguishment, and slightly increasing the current quick assets.

A feature of the corporation's position as to indebtedness which does not appear to have received sufficient attention from the layman is the long list of subsidiary bonds. Their interest charge is deducted before the corporation's "net earnings" are presented, although their capital payment is deferred until such net earnings have been ascertained. Their volume has been increased by the Union-Sharon acquisition, and amounted on December 31, 1903, to $99,819,535 in the hands of the public; counting those in sinking funds, which still draw interest, the total is $102,402,535. Of these, $41,217,000, representing the Union bonds, take a 2 percent sinking fund. Of the remainder, about $21,000,000 fall due in various amounts in the next 10 years.

Assuming net earnings on the basis of any going concern, having no deductions for bond interest, the charges which the corporation will have to meet annually in the next few years are the following:

Principal charges:		
Annual average on $21,000,000 subsidiary bonds falling due within 10 years from Jan. 1, 1904		$ 2,100,000
2 percent sinking fund, Union bonds		824,340
1 percent sinking fund, corporation first mortgage		3,040,000
Sinking fund, corporation 2d mortgage		1,010,000
		$6,974,340
Interest charges:		
Miscellaneous subsidiary bonds	$ 61,185,535*	
Union bonds	41,217,000	
Corporation 1st mortgage bonds	303,917,000	
Corporation 2d mortgage bonds	170,000,000	
	$576,319,535	
at 5 percent,		$28,815,977
Total annual principal and interest charges		$35,790,317
Required for preferred dividends (on $360,281,100)		25,219,677
Total bond and preferred stock requirements		$61,009,994

*A small proportion bears 6 percent and a still smaller proportion 4½ percent.

The above may be taken to represent the corporation's total requirements. In the past two years it has paid off the great bulk of purchase money obligations, special deposits, etc., which were not funded, and the balance is about covered by the cash which is yet to be realized on delivery of the remainder of the $20,000,000 of second mortgage bonds disposed of for cash. Such cash will be called for as needed, a little bond interest being saved meanwhile.

The bond principal and interest charges noted, amounting to nearly $36,000,000, are not to be compared with net earnings as previously reported by the corporation, since such statements are made after the subsidiary bond interest has been met, amounting in 1903 to $5,756,488. In comparing the corporation's position with that of other companies, free from bond and mortgage obligations, this figure is the true measure. On an output of 8,000,000 tons annually, a fair assumption of partly and wholly finished material, it represents $4.50 per ton, while the full preferred dividend represents $3.15 additional, or a total of $7.65 without providing for common stock dividends.

The report has been current in Colorado and published in newspapers of that State that the Colorado Fuel & Iron Co. has planned to build four additional blast furnaces, two to be located at the iron mines of the company at Sunrise, Wyoming, and two at Pueblo, Colo. We are advised by the company that there is no truth whatever in the report.

The United States Steel Corporation, which last year canceled its coal contract with the Pittsburg Coal Co. on account of the refusal of the latter to reduce prices, has, it is reported, resumed relations with the company and contracted for a year's supply, which amounts to about 4,000,000 tons of coal. It is said that the contract is at a price from 50 cents to 60 cents a ton below that of last year.

The South Pittsburg Iron Works, Claysville, Pa., received the contract for the fitting and erection of the structural steel for the First National Bank nine-story building, Columbus, O. About 650 tons of steel will be required.

Bids for cast iron pipe and special castings for the extension of the water system of Cincinnati are to be in hand by May 3. The requirements for this year are from 16,000 to 18,000 tons.

The Labor Situation.

STOVE FOUNDERS' AND MOULDERS' CONFERENCE.

Brief reference was made in our issue of last week to the important results of the conference held at Chicago March 22, 23, 24, 25 and 26 between representatives of the Iron Molders' Union of North America and the Stove Founders' Association. The question of the apprenticeship ratio, on which the molders' union has shown some disposition to adapt itself to the changed conditions in the trade, came up for discussion again, and while the result cannot be regarded as any very tangible concession, it may open the way for some flexibility and to that extent remove the hardship under which some shops have operated. The following is the text of the various resolutions adopted at the conference:

"Resolved, that the Iron Molders' Union of North America shall not itself or by any of its agents in any manner discriminate against goods manufactured or sold by any member of the Stove Founders' National Defense Association, because of the unwillingness of such member of said association to use the union label, and that a copy of this resolution be duly attested by the president and secretary of the respective organizations with the seal of each organization thereto and a fac-simile thereof be furnished each member of the Stove Founders' National Defense Association and each local of the Iron Molders' Union of North America."

"Resolved, that when the price of piece work has been agreed to between a member of the S. F. N. D. A. or his representative and a price committee representing the molders in his shop, such price shall be reduced to writing at that time and shall be signed by both parties and when so signed shall be final and binding."

"Resolved, that in view of the fact that no agreement has been reached by and between the S. F. N. D. A. and the I. M. U. of N. A. on the apprentice question, and because of this fact there is a possibility of more or less friction, it is agreed that whenever a member of the S. F. N. D. A. finds he cannot secure the molders he may require for the needs of his business, the question shall be referred to the presidents of the two associations or their representatives for investigation and relief. If it be found that the foundryman is entitled to relief he shall be allowed to employ such additional number of apprentices as shall be agreed upon."

"Resolved, that the general rate of wages to molders in the foundries of the members of the Stove Founders' National Defense Association that prevailed during the year ending March 31, 1904, shall be the established rate for the year ending March 31, 1905."

NATIONAL FOUNDERS' ASSOCIATION HELD TO BE A PARTNERSHIP.

A decision in the common pleas court at Akron, O., dismissing the suit of J. H. Webster, J. D. Leary, Charles A. Stowers, C. H. Morgan and H. J. Boggis, constituting the district committee for the Fourth district of the National Founders' Association, against Taplin, Rice & Co., for the collection of dues, is of considerable importance to members of manufacturers' associations. The suit has been in the courts since May 25, 1903. After the petition had been filed Taplin, Rice & Co. made a motion to have the National Founders' Association make its petition more definite. This was done and the company demurred to the amended petition, asking that it be dismissed on the ground that the association was in law a partnership and not a corporation and as such could not sue one of its members. The court held that as the association was formed for profit, the common law considered it wholly in the light of a partnership and as such the organization could neither sue nor be sued by one of its members.

The suit against the company was for the collection of $1,123, alleged assessments and dues to the National Founders' Association. It was alleged that on March 20, 1900, Taplin, Rice & Co. were admitted as members of the association, promising to pay the dues, assessments, etc. It was claimed that there was due the association on the regular yearly dues $112; for the assessment of 10 cents per month for each molder employed it was claimed that $244 was due the reserve fund of the association. For special assessments of the administrative council $660 was claimed, and it was further alleged that the company was delinquent in the matter of other assessments.

The association represented to the court in its brief on the demurrer of the defendant that the National Founders' Association was formed for the purpose of conducting affairs between the employers and the employes and for the purpose of protecting the former in its dealings with the latter. It claimed that the organization was not for profit, but was rather an insurance organization.

The decision of the common pleas court does not end the case as it is understood the association will carry the case to the circuit court, and it may ultimately go to the supreme court.

SHEET AND TIN PLATE WAGE REDUCTION REFUSED.

The sheet and tin plate workers of the Amalgamated Association refused, by an overwhelming vote, to accept the reduction agreed to by the executive board of that organization, and which became effective on March 21 and continued until April 2. The votes were counted on Saturday, April 2, by the executive committee and the result was exactly what was predicted in these columns last week. Negotiations were immediately reopened with the officials of the American Sheet & Tin Plate Co. and it was decided that a special convention of the tin and sheet lodges be held in Pittsburg on April 6. All of the sheet and tin plate workers returned to work Monday morning and will await the action of the convention. In the meantime the men are to work at the wages that the convention decide upon as proper for the interim. Unless the reduction is accepted it is probable that a strike will be declared, but the Amalgamated officials will do everything in their power to prevent any trouble. Both tin mills of the American Sheet & Tin Plate Co., New Kensington, Pa., are operating in full.

CONSIDERING SHEET AND TIN PLATE SCALES.

(Special Telegram.)

PITTSBURG, April 6.—The special convention of the Amalgamated Association to reconsider recent reductions in sheet and tin plate scales held its first session this morning in Moorhead's hall. Another session will be held this afternoon. Invitations have been sent to all the independent sheet and tin plate companies to attend the sessions tomorrow, when the delegates desire to hear the manufacturers' side.

NATIONAL METAL TRADES ASSOCIATION.

Arrangements are being made for a meeting of the administrative council the latter part of this month. One of the most important subjects to be considered at this meeting will be the duplication of work which has been found to result from a lack of definite understanding with other employers' associations, local metal trades' associations, etc. Reports and discussions at the recent convention in Philadelphia make it clear that this subject should be taken up. It is probable that a joint committee will be appointed from the various associations of employers to discuss this question and formulate some plan which shall avoid duplication of work, particularly in circularizing the country and carrying on educational work relative to various legislative and other measures in which all of these associations are equally interested.

The Adams & Westlake Co., one of the members of the National Metal Trades' Association, has become involved in a labor difficulty through membership in the Chicago Brass Manufacturers' Association. Commissioner DuBrul left Cincinnati for Chicago on Monday evening to take measures to protect the Adams & Westlake Co.'s interests.

The Blakeslee Mfg. Co., of DuQuoin, Ill., reported to the association headquarters a call from a business agent intimating that certain demands would be presented in the near future, which presages labor difficulties in that direction.

LABOR NOTES.

Two hundred and fifty employes of the billet mill of the Pennsylvania Steel Works, Steelton, Pa., quit work a few days ago on account of a recent reduction of wages.

The strike which originated at the Holt Mfg. Works, at Stockton, Cal., is extending. The machinists of the Globe

Foundry Co., of that city, have followed the molders and blacksmiths of that company in going on a strike. The machinists went out because an apprentice was put to work making cores.

About 70 employes of the American Can Co.'s plant, at Toledo, O., have gone on a strike, the strikers charging that the union has been discriminated against. The superintendent states that less than one-third of the shop force is included in the strikers, and that the plant has suffered but little as a result of the walkout.

Because the Henry Vogt Machine Co., Louisville, Ky., was doing work on boilers for the Southern Railway Co., against which a boycott had been declared, fourteen boilermakers and helpers went on a strike. The work is being done by new men and Mr. Vogt states that no inconvenience was caused by the men leaving.

Furnace workers of the Mahoning Valley and other districts are talking of demanding a restoration of the old rate of wages. A meeting of representatives of the union was held a few days ago at Youngstown, O., and the sentiment is said to have been in favor of this demand. Final action will be taken at a meeting to be held in Cleveland at an early date.

President Eliot, of Harvard, who recently delivered an address on the labor question in Faneuil Hall, Boston, has declined to allow the address to be published under the union label. He states that he refused to permit the use of the label because it represents the closed shop, and the closed shop implies the denial of free competition.

A strike illustrative of the extreme to which labor unions will sometimes go was declared last week in the foundry of the General Electric Co., at Schenectady, N. Y. One molder who continued turning out more work than the rules of the union permitted was visited frequently by the union shop committee and urged to stop working so hard. He continued without paying any attention to the committee until the members of the committee attempted to force him to quit doing so much work, whereupon he assaulted one of the members of the committee. The result was that 800 employes, whose daily wages aggregate about $2,400, went on a strike. They soon realized the folly of their action and returned to work the next day.

Molders and their employers representing Eastern Pennsylvania districts have reached an agreement to renew the scale effective during the last two years, in which the minimum is $2.75 a day of ten hours.

Operations at the billet mill of the Pennsylvania Steel Co., Steelton, Pa., have been resumed. The strike was due to dissatisfaction on account of the change in the number of men in each gang from five to four. After a conference with the general officers, a satisfactory agreement was reached.

A strike in Chicago that had been attended by much violence has been ended by the signing of a remarkable agreement. The compact is between the Liquid Carbonic Acid Gas Mfg. Co. and the metal polishers, platers, buffers and brass workers and brass molders' unions. The arrangement binds the company not to do work for other employers of labor whose employes are on a strike. The closed shop and the nine-hour day are granted. Any further difficulties are to be arbitrated.

The unorganized heaters, rollers and helpers, numbering about 150, employed by the Sellers Mfg. Co., Chicago, are on strike against a proposed reduction of wages.

Representatives of the American Can Co. and of the various unions on strike in the three Chicago plants of the company have agreed last week upon a settlment of the strike. The old wage scale was to be entorced and later joint committees were to formulate a new scale. Owing, however, to the retention by the company of 35 Greek "strike breakers," the union employes of the plant refused last Monday to return to work. A disturbance in the plant and a running fight between the Greeks and the union can workers created much excitement.

The annual meeting of the Chicago Metal Trades Association was held at the Sherman House last week. The following officers were elected: President, John D. Hibbard; vice president, George C. Purdy; secretary, Paul Blatchford; treasurer, J. J. Walser Jr. The executive board consists of the above named officers and F. K. Copeland, H. H. Latham, F. S. North and John W. O'Leary.

The John B. Honor Co., stevedore, of New Orleans, has recovered judgment of $12,000 against the Longshoremen's Labor Union. A three-year contract was signed with the white longshoremen on April 29, 1903, and was broken three days later by all the employes, save three, going on a sympathetic strike. Mr. Honor has now offered to relinquish the judgment if the longshoremen will give bonds to fulfill the terms of the original contract which they broke. The longshoremen will not accept this offer and say it will be impossible for Mr. Honor to execute the judgment, as the union has neither real estate nor money.

Chicago Pneumatic Tool Co.

The adjourned meeting of stockholders of the Chicago Pneumatic Tool Co. was held in New York April 4. The three directors whose terms were about to expire were reelected. They are J. R. McGinley, Pittsburg; Joseph Boyer, Detroit, Mich.; Archibald W. Maconachie, London, England. Following the meeting of stockholders, the directors elected these officers: J. W. Duntley, president; W. O. Duntley, vice president; S. W. Prince, secretary and treasurer; W. B. Seelig, auditor; W. J. Calhoun, general counsel; J. W. Duntley, C. M. Schwab and J. R. McGinley, executive committee. A new executive office entitled "chairman of the board" was created, with special powers, including supervision over the financial affairs of the company. John R. McGinley, of Pittsburg, was elected to that office.

The financial statement shows that all the earnings for 1903, which were $195,595 less than in 1902, were exhausted in the payment of 6 percent on the stock and the writing off of the balance for depreciation, the cost of defending the company's patents, the consolidation of the Aurora and Cleveland plants and for other expenses. The net profits reported for 1903 were $701,464 and nothing was carried to surplus. The earnings applicable to the stock were just the 6 percent paid in dividends. Earnings in the preceding year were about 9 percent on the company's stock issue. The assets in 1902 were $8,889,600, and in 1903 $8,816,171.

Blast Furnace Wages.

(Special Telegram.)

PITTSBURG, April 6.—The Blast Furnace Workers' Association will shortly demand a restoration of the wages prevailing before the reductions were made during the months of December and January. At a meeting of delegates from various Valley furnaces held at Youngstown Tuesday it was the unanimous sentiment that wages should be restored, and a meeting of the executive board of the association will be held in Cleveland shortly for the purpose of taking definite action.

Standard Threads for Lag Screws.

A number of facsimile letters addressed to the New Jersey Foundry & Machine Co., of New York, confirm the announcement that the leading lag screw manufacturers have accepted as a standard the threads fitting the Diamond expansion shield. The standard threads for coach screws under this arrangement are: 5-16-inch diameter, 9 threads per inch; ⅜-inch diameter, 7 threads per inch; ½-inch, 6 threads per inch; ⅝-inch diameter, 5 threads per inch; ¾-inch diameter, 4½ threads per inch. The following firms are making these lag screws; Oliver Iron & Steel Co., Pittsburg; American Iron & Steel Mfg. Co., Lebanon, Pa.; New Castle Forge & Bolt Co., New Castle, Pa.; Payne's Bolt Works, San Francisco; Hoopes & Townsend Co., Philadelphia; Upson Nut Co., Cleveland; Wm. H. Haskell Mfg. Co., Pawtucket, R. I.; Pawtucket Mfg. Co., Pawtucket, R. I.; Pottsville Bolt Co., Pottsville, Pa.; Lamson & Sessions Co., Cleveland; Lake Erie Iron Co., Cleveland; Rockford Bolt Works, Rockford, Ill.

Wm. N. Whitely, of Springfield, O., whose plan to organize a company and build a plant for manufacturing harvesting machinery has been mentioned, announces that a site of 250 acres at Springfield has been purchased and that shops which will employ 2,000 men will be built. The company will be incorporated at Columbus under the name of the Farmers' Co-Operative Harvesting Machine & Implement Co. of North America. The authorized capital will be $5,000,000, of which the National Grange is expected to subscribe for $1,500,000.

Cincinnati Machinery Market.

CINCINNATI, April 5.—A more cheerful tone is to be noted in the machinery market than has prevailed for some time. There seems to be a general improvement in the demand and shops show signs of increasing activity in almost all lines. There has been no general resumption of buying shop equipment on the part of the railroads, but the orders from other sources are footing up more business right along. The output of the manufacturers is of course still far below the maximum, and some are still running short time with reduced working forces, but there is a gradual tendency to increase working time and take on additional men. Correspondence and inquiry indicate that there is enough business in prospect to justify a hopeful view of the situation. Some of the shops which a month ago were inclined to complain quite bitterly of dull business are now running on longer time and have booked enough orders to make them entertain a more encouraging feeling as to the outlook. A fair run of export orders are coming in, which is a help in making up the aggregate.

Prices are maintained and some makers have even advanced quotations on certain sizes of lathes.

The Fosdick Machine Tool Co. finds trade still quiet, but there is a good line of inquiry coming in and the outlook is favorable for an increase in the volume of orders.

Greaves & Klusman are running full time and practically full handed and have enough business in hand to keep them going right along. From the point of inquiry they regard the situation as quite good.

The John Steptoe Shaper Co. reports trade good and is running full time with all the force it can work to advantage. The company has taken on some good export orders, besides enjoying a liberal domestic business.

The Rahn-Mayer-Carpenter Co. notes an improvement in the demand and regards the situation as better not only in the character of its correspondence but in actual orders coming in.

The Cincinnati Milling Machine Co. says the month of March was the best month the company has had in the past six months. The outlook is better and inquiry is increasing. Foreign business has been quite satisfactory.

The Cincinnati Planer Co. is running full time and comments on the large number of inquiries coming in as indicating a more hopeful prospect. At the present rate the company estimates that the year's result will be at least 50 percent of the very heavy business of last year.

The Dreses Machine Tool Co. reports trade holding up about as in the recent past, with the outlook fairly encouraging.

The Lodge & Shipley Machine Tool Co.'s business, while not up to normal, is still showing improvement steadily. The company finds that inquiries are good and takes a hopeful view of the outlook.

The Queen City Machine Tool Co., making shapers exclusively, has had a good run of orders and the company is quite encouraged over the prospects for early business.

The King Machine Tool Co. has made a specialty of boring machines for railroad shops and as railroads have been rather slow in placing orders in the past few months, trade is reported as quiet. The company expects to add to its line of machines in the near future.

The Von Wyck Machine Tool Co. reports a quiet trade the past month, but the outlook is now more hopeful.

The Osterlein Machine Co. reports trade slowly improving and prospects better.

The Cincinnati Shaper Co. notes conditions somewhat better the past month.

Wm. E. Gang & Co. have had a good month. They are now getting out and have about ready for shipment to Chicago seven of their motor-driven radial drills on one order.

The American Tool Works Co. finds a gradual improvement in demand for machine tools. The company is working about 400 men and is taking on more help gradually. The outlook is encouraging and the past month shows an increase over the preceding two or three months.

The buildings which the United States Malleable Iron Co., Toledo, O., is erecting will cover about 32,000 sq. ft., consisting of foundry, pattern storage and office building. At the present time concrete foundations are being put in place.

PITTSBURG FOUNDRYMEN'S ASSOCIATION.

The members of the Pittsburg Foundrymen's Association visited the blast furnace plant of the Clinton Iron & Steel Co., on the South Side, Pittsburg, on Monday night, April 4. No regular meeting of the association was held. The party was taken to the furnace plant from the meeting rooms in a special car and the visit was timed so that the tapping of the furnace could be witnessed. The plant is one of the most complete in the country, being equipped with all the modern appliances known to blast furnace practice. The product consists largely of foundry iron and the iron is sand cast. The slag is all run into a pit where it is granulated and then loaded into cars by means of a clam shell bucket. Duplicates of all the machines required for operating the furnace are provided so that there will be no delay in operations from breakdowns or repairs, etc. The chemical laboratory interested many of the visitors, being complete in its equipment. All of the material entering the furnace is analyzed, while tests are made of every cast and all of the iron is inspected. After the tour of inspection the party was served an elaborate lunch in the company offices. The following were in attendance:

C. W. Jones, Rosedale Foundry & Machine Co.
Theodore Werndly, McKinney Mfg. Co.
J. P. Bassett Jr., Rogers, Brown & Co.
Bryan Robertson, Field-Evans Iron Co.
H. J. Dorsey, Enterprise Foundry Co.
F. A. Johns, Enterprise Foundry Co.
W. J. Phillips, Phillips & McLaren.
C. A. Phillips, Phillips & McLaren.
P. M. Phillips, Phillips & McLaren.
John R. Graves, Hyatt Roller Bearing Co., Harrison, N. J.
Louis Knapp, Pennsylvania Malleable Co.
S. F. Warren, Pennsylvania Malleable Co.
Harry Price, Cherry Valley Iron Co.
Mr. Layng.
Mr. Paget.
Mr. Rosenberg, S. Obermayer Co.
W. J. Naeser, Yagle Foundry & Machine Co.
Valentine Legler, Yagle Foundry & Machine Co.
Wm. Yagle, Yagle Foundry & Machine Co.
Mr. Johnson, Taylor-Wilson & Co.
William Carlin, Thos. Carlin Sons Co.
D. M. Carlin, Thos. Carlin Sons Co.
W. J. Chesebrough.
C. I. Dame.
H. S. Ridenour, Thos. Carlin Sons Co.
Geo. Brehe.
G. A. Bauman, Jones & Laughlin Steel Co.
John Logan, Jones & Laughlin Steel Co.
D. J. Thomas, Sterrit-Thomas Foundry Co.
Henry Spilker, Sterrit-Thomas Foundry Co.
Paul L. Hay, Whiting Foundry & Equipment Co.
J. E. Jones, Seaman-Sleeth Co.
Charles Townsend, Thos. Carlin Sons Co.
A. W. Slocum, National Car Wheel Co.
A. O. Backert, *The Iron Trade Review.*
H. L. Hutchinson.
W. W. Clark, Keystone Car Wheel Co.
Stuart Marshall, L. & R. Wister & Co.
W. D. Alexander, Pennsylvania Malleable Co.
W. J. Davis, H. K. Porter & Co.
James Saville, Sterrit-Thomas Foundry Co.
J. L. Orrell, Union Foundry & Machine Co.
W. H. Wooten.
J. Tivol.
J. H. Robinson, Pittsburg Mfg. Co.
F. H. Zimmers, Union Foundry & Machine Co.
W. H. Stousser, Union Foundry & Machine Co.
E. D. Frohman, S. Obermayer Co.

The plant of the Allis-Chalmers Co., Wilkesbarre, Pa., is to be abandoned and the machinery is to be removed to Scranton, Pa. Machinists and apprentices formerly employed in the Wilkesbarre shops will be given employment in Scranton. The company has recently installed an electric power system and made many other improvements to its plant at Scranton.

Three prominent German government officials visited the steel plants at Pittsburg this week, and on Tuesday evening were entertained at dinner at the Union Club by Victor Beutner. The party included President Havenstein, of the Royal Prussian bank; Hr. Doenhoff, privy councilor of the department of commerce; and Dr. von Loehr, privy councilor of the foreign office.

TRADE PUBLICATIONS.

Catalogue No. 4 of the Thew Automatic Shovel Co., Lorain, O., presents attractively the varied types of Thew shovels, excavators and dredges, with details of the construction of each and the service to which it is specially adapted. These include the No. 0, which handles ordinary soils, gravels or loose materials in quantities not exceeding 200 cubic yards a day; No. 1, which is intended for brickyards and cement works and light contracting work; No. 2, for handling shales, fire clay and difficult materials without blasting; No. 3, for use about blast furnace yards, for mining iron ore and for general contract equirements; Nos. 7, 8 and 9 excavators, weighing respectively 45, 65 and 85 tons, which represent the heaviest types. There are illustrations of the Thew shovel doing various kinds of work, and the descriptive matter enlarges upon the performance and possibilities of this shovel for handling ores, for mines, for clay-working industries and for contractors' work. Where conditions preclude the use of steam the engines and boilers are replaced by electric motors, and in this case a counterweight is employed to secure stability. Where the electrical design is adopted the shovel becomes a strictly one-man machine.

A cloth-bound 8vo of 370 pages, general catalogue No. 40 of the S. Obermayer Co., gives an impressive idea of the diversity and volume of supplies of the foundry, represented in the stocks of this house. Nearly 1,100 different terms appear in the 11 pages of index, and the body of the volume is full of illustrations of the various forms of equipment employed in the foundry. A history of the company is given, together with views of its offices and facing plants. The firm was founded in 1874 and its original quarters were in a small frame building in Cincinnati.

The cloth bound catalogue of 750 pages, 9 x 12-inch, treating of the product of the Niles-Bement-Pond Co., of New York, is a remarkably complete and beautifully printed specimen. The halftones are particularly fine and the excellent paper and ample size of page exhibit the highly finished engravings in admirable style. There are a number of views of the different plants of the company and thirteen pages of reproductions of medals and diplomas awarded the various constituent firms, these medals dating back to 1871, though the awards of the more recent expositions are by far the more numerous. The classification of the tools commences with machines for railroad shop use. Fourteen full page illustrations are given of driving wheel lathes, showing all sizes from 51-inch to 100-inch swing, and one or two special machines adapted particularly to the use of modern high power tool steels. The other railroad tools include different styles of car wheel lathes, axle lathes, cutting off and centering machines, quartering machines, car wheel borers and hydrostatic wheel presses. The next division has all sizes of lathes, from the Pratt & Whitney bench lathe to the massive Bement 125-inch crank shaft lathe. A number of special lathes, including pulley lathes, turret lathes and automatic screw machines, are shown. Fifty pages are devoted to planers. Various methods of driving by magnetic clutches and motors are illustrated. The large portable rotary planers are very interesting. These machines are selfcontained, the motor being mounted on the saddle. The largest has a swing of 120 inches, and can be lifted by a crane and placed in any position on a floor plate. Slotters and millers take many pages; several handsome full page illustrations being devoted to work done on the thread milling machine. A number of heavy vertical, radial and multiple drills are shown. A complete line of horizontal boring, drilling and milling machines is shown. Fifty pages are devoted to boring and turning mills. These are followed by miscellaneous machine tools, boiler shop machinery, steam hammers, traveling cranes and small tools. Metric as well as English dimensions are given throughout. The book weighs ten pounds and the entire edition amounted to 75 tons of catalogues.

The Otto Gas Engine Works, of Philadelphia, have about completed arrangements to remove their plant from that city to Wilmington, Del. A 30-acre tract has practically been secured and all the negotiations for the removal are well under way.

NEW BOOKS.

"Engineers' Arithmetic," by Fred H. Colvin and Walter L. Cheney, is a pocket manual of 4 x 6 inches, with 122 pages. The work is a stepping stone toward the handling of problems current in steam engineering. Calculations are the application of rules to specific examples and the authors have closely adhered to the scheme adopted in the companion volume, "Machine Shop Arithmetic," and have concisely and luminously explained many of the difficulties in the elementary stgaes of practical mathematics. The book has also a brief but useful glossary of steam engineering terms; tables of wrought iron pipe, average pressures for different cut-off, circumference and area of circles and properties of saturated steam. It is well bound in cloth and is mailed in stout cardboard covers which ensure conveyance in perfect order. Published by the Derry-Collard Co., of New York. Price 50 cents.

"A Compendium of Drawing" and other papers from the American School of Correspondence at the Armour Institute of Technology, Chicago, are suggestive of the scope taken in the instruction courses. They indicate the character of tne ability behind them, but of course there is more than the book to a correspondence course worthy of the name. There is a personal element in following the mental growth and capacity of the student as he receives special instruction, the grading of the pace to his needs, supplying explanatory data from time to time, tactful encouragement, etc., that the book arranged for a more general purpose cannot so adequately furnish. The chief aim of the present work is to acquaint the public with the practical value and scope of the instruction papers from which it is compiled and sufficient information is given to arouse in the reader a desire to know more. The school presents a varied array of courses in technical education. The two volumes of the "Compendium of Drawing" contain freely illustrated papers on mechanical drawing, shades and shadows, perspective, pen and ink rendering, architectural lettering, shop drawing, mechanism, machine design, tin smithing, sheet metal pattern drafting, in the order named. Taking one of these essays as typical of the method employed, and we may select the paper on machine design as a good example. The paper is in the first instance the product of a practicing mechanical engineer, Chas. L. Griffin, formerly professor in the Pennsylvania State College. He gives at the start a number of the limiting factors influencing design, the effect of plant conditions upon product, the commercial and theoretical potencies behind the task of design, the important questions of quantity required, lubrication possibilities and other considerations of construction and ultimate utility. Mr. Griffin then takes a concrete example in design, works out the details of the machine, gives exact reproductions of his notebook pages with calculations and rough sketches of the parts. He shows the influence of practice on theory and the importance of preserving data in neat and easily reached forms. The growth of a design from the specifications of requirements and first crude ideas of the essential shape and size of elements to final forms are interspersed with practical comments of construction concern from drafting room onward. The two volumes comprising the subjects mentioned are 6½ x 9½ inches and contain some 900 pages, well illustrated and cloth bound. Price, $8.

A. C. Williams, of Ravenna, O., has purchased the hardware specialty manufacturing business of the Sheehan Mfg. Co., of Salem, O., including all machinery, patterns, patents and good will, and is dismantling the plant at Salem and moving the business to Ravenna. Mr. Williams has just let a contract for a 100-ft. addition to the finishing department of his plant. A record in the manufacture of hardware specialties is claimed by Mr. Williams in that his factory, employing 200 men, has been operated to its complete capacity every day excepting holidays and Sundays for nine years.

The mining of ore has been stopped at the Ashland mine at Ironwood, Mich., operated by the Cleveland-Cliffs Iron Co. Considerable ore was left on the stockpiles last fall and the mine has been operated continuously during the winter. The result is that all available space for piling ore is occupied. It is expected that the mine will resume operations after enough ore has been shipped to give space for new stock piles.

Philadelphia Machinery Market.

PHILADELPHIA, April 4.—There was no improvement in the demand for machinery during the month just closed. The market was dull in tone and it is a matter of opinion whether it was not in a worse condition than during February. There was an entire absence of any feature approaching steadiness, and the fact was particularly noticeable that most concerns receiving encouragement from their February trade found March business anything but satisfactory; while others who were lacking in orders during February made some nice bookings during March. Taking all in all the situation may be said to be unchanged since last reported.

The first quarter of the year has certainly proved disappointing, and it is a long time since similar conditions existed. There is no doubt that the hard winter was responsible in a large measure for the paucity of business, but the alarmist has got in his work and a great deal of distrust is evident as to the probability of 1904 yielding a volume of business which shall be considered satisfactory.

Prices are fairly well maintained and builders are not forcing business. Outside conditions have not been favorable to reductions in prices, materials in general holding up in price, and labor conceding no reductions. A few foundrymen have shown signs of scare and have offered to take business at prices which even at the present level of foundry irons could not result in profit, but it cannot be learned that the inducements were taken advantage of to any extent. Light cored castings have been offered as low as $1.40 per 100 lb.

Many shops here closed for three days at Easter, a longer period than usual at this time. Very few establishments are running to the full extent of their capacity, working forces being very much reduced. Two of the largest plants in this city are operating only five days a week.

In spite of existing conditions the outlook has encouragement in it. There are some transactions of magnitude developing which, when completed, will call for the employment of a great deal of new machinery. Much interest centers on the awarding of contracts for the finished material to be used in the tunnel work for the Pennsylvania railroad, contracts for the building of which have already been awarded. The secret of the plans of the company is pretty well kept, and no one has any idea as to the manner in which the material will be turned out. It is hinted in many quarters that the company will undertake much of the work itself, but in others the idea is scouted as both improbable and impossible. The finishing of the immense tunnel sections will require, in any event, a quantity of special tools, and those able to bid on them are on the lookout for early information.

Foreign business shows a marked improvement both in orders and inquiries, and greater efforts are being made to interest foreign buyers.

It is understood that the contract price for the 101 elevators to be installed in the New York and Philadelphia stores of John Wanamaker by the Standard Plunger Elevator Co. is $1,250,000.

The Department of Public Health and Charities of this city is calling for bids to be in by April 11 for the construction of a power house, electric plant, engines, boilers and other equipment for the new municipal hospital. Plans and specifications may be obtained of Philip H. Johnson, the architect, 1825 Land Title building, upon depositing $200, which sum is to be refunded upon return of the plans and specifications. Bids from others than those engaged in actual business in the general branches mentioned in the specifications will not be entertained or considered.

The supervising architect of the Treasury Department is receiving bids, to be in not later than April 9, for the installation of an electric elevator in building No. 4 at League Island Navy Yard.

Plans have been prepared by Chief Engineer W. R. Brown, of the Pennsylvania railroad, for a large erecting and machine shop, 192 ft. x 198 ft., to be erected at the Olean shops on the B. & A. V. division of the Pennsylvania railroad. The plans are posted for estimates.

An electric lighting plant, a 150 to 200-h. p. engine, with direct connections; a cold storage and ice making plant, and a water cooling plant are included in the improvements to the mechanical equipment of the Bingham House in this city. It is understood that the Pennsylvania Iron Works of Philadelphia, and the York Mfg. Co. of York, Pa., have contracts for most of the requirements.

The plant of the Atlantic Works, Inc., builders of woodworking machinery, has been removed to their new shops at 28th street and Gray's Ferry Road.

The Dodge Mfg. Co., Mishawaka, Ind., manufacturer of wood pulleys, etc., has opened a branch at 13th street and Pennsylvania avenue in this city.

The Newton Machine Tool Works made a good many shipments in March, mostly covering slotting machines, cold saws, milling machines and rotary planers, all of ordinary and standard sizes. Orders booked were fairly numerous but confined to machines of small to medium size.

The Falkenau-Sinclair Machine Co. reports a fair month's business. A good many orders for presses and cement testing machines were booked, and its shipments were heavier than for some time, although made up of standard machines unimportant in size.

The Philadelphia Pneumatic Tool Co. reports a slight falling off in the home demand for pneumatic tools, but export orders were particularly good. Inquiries, it states, are highly satisfactory in both number and scope.

The Eynon-Evans Mfg. Co. reports an improvement during March in the demand for its line of specialties, particularly injectors and blowers.

The Espen-Lucas Machine Works report the demand for their cold saw cutting-off machines to be good and that prospects for the near future are fairly satisfactory. They are also building a line of horizontal boring machines and other tools.

The Hess Machine Works booked some good orders in March, mostly for file and rasp cutting machinery. They recently made shipments of file-making outfits to England nd France.

Regular Steel Corporation Dividend.

At a meeting held in New York April 5, the directors of the United States Steel Corporation declared the regular quarterly dividend of 1¾ percent on the preferred stock. The amount thus applied to the dividend was $6,304,919, and in order to meet this payment a deficit for the quarter of $1,857,120 was created. Earnings for the last quarter (March estimated at $5,800,000) amounted to $13,208,886. Although the lowest in the corporation's history they were better than was expected by the public. They were less by $1,828,295 than the earnings for the fourth quarter of last year. It was thought that the corporation's new system of accounting, inaugurated with the new year, under which earnings are not credited until the product has actually been sold, would tend to reduce profits in this quarter.

Earnings for the first quarter of 1903 were $25,068,707 and for the corresponding period of 1902 were $26,715,457, in both cases more than enough to meet the dividends on both preferred and common shares. Unfilled orders on hand for the quarter amounted to 4,136,961 tons, an increase of 921,838 tons over the quarter ended Dec. 31 last.

The preferred dividend is payable May 16. Action on the dividend was reported to be unanimous. No action was taken on the question of a dividend on the common stock.

The directors in attendance included J. P. Morgan, H. C. Frick, Charles M. Schwab, D. G. Reid, W. H. Moore, George W. Perkins, Robert Bacon, President William E. Corey, F. L. Stetson, J. F. Dryden, John D. Rockefeller Jr., C. A. Griscom, E. H. Gary, E. C. Converse, Norman B. Ream, H. H. Rogers, James Gayley, William Edenborn and P. A. B. Widener.

The Mark Mfg. Co., of Chicago, has leased the plant of the Eastern Tube Co., at Zanesville, O., recently in the hands of a receiver. The plant was built in 1900 at a cost of about $1,000,000, and has three lap-weld furnaces. Its capacity is 350 tons of pipe a day. At its Evanston plant the Mark Mfg. Co. has a capacity of 150 tons of pipe a day, in addition to its output of pumps, plumbing tools and hardware specialties. The Zanesville plant is equipped to turn out pipe from ½ inch to 16 inch.

110 and 220 volts, may be already available. In this case an ordinary 220-volt motor will run at half speed when its field is supplied with the 220-volt current and the armature with the 110, in this case as in the previous one it will be necessary to provide intermediate speeds. Taking a 50 percent increase and 25 percent reduction, as before, the speed may be varied between .75 and 3. This system might also be combined with the previous one, using a double commutator motor, to give a variation between .75 and 7.8. The controller for such a combination would, however, be somewhat complicated. This system, like the previous one, would be efficient from an electrical standpoint except during the time that the speed is reduced by means of the armature resistance; then power would be wasted as already explained, the maximum amount being somewhat over 25 percent. The 220-volt motor, while running on 110 volts, would give but half its rated horsepower and a heavy motor would therefore be required. All systems, however, require about the same size of motor to deliver a given horsepower when their minimum speeds are the same. It is doubtful if it would ever be advisable to install this system of wiring merely to obtain motor regulation, though in a plant where there are a very large number of lights and but few motors it would have some advantages.

Multi-Voltage System.

The "multi-voltage" system, although an expensive one to install, undoubtedly gives the best results where a wide speed variation is required. The principle is the same as that in the three-wire system already mentioned. That is to say, the field of the motor is excited by a current of constant voltage while different speeds are obtained by connecting the armature with currents of other voltages. In the three-wire system but two voltages were obtainable, but in the multi-voltage system as generally installed there are six different speeds in proportion to the voltages employed. Such a wide variation may be obtained by this means that double commutator motors and resistances in the armature circuit are not needed, a variation in the field current being ample for giving all intermediate speeds. The system has a high electrical efficiency, though of course heavy motors must be employed to give the power at low speeds. To supply the six voltages three machines in addition to the main generator are required. These have their shafts rigidly connected, are generally located at a point nearer the motors than is the main generator and are driven by the latter in much the same manner as an ordinary motor. The action of the individual machines may be either that of a motor or generator according to the voltage of the current being used by the machine motors. Each is wound for a different voltage and the one called upon to give current as a generator will be driven by one or both of the others acting as motors. The size of these machines will depend of course upon the amount of power used in the shop. A system of four wires must run from these machines to all the motors on the system, and the motor controllers are so arranged that the armature of the motor may be connected to the voltage of any one of the three machines, to the combined voltages of the three or to the combined voltages of the first and second or second and third machines. By using only two auxiliary machines and three wires, three voltages would be available while by increasing the number of the machines to four and the wires to five, ten voltages would be possible. The expense of installing the multi-voltage system will be higher in comparison to the others when but few motors are used; the machines for furnishing the multi-voltage will have to be larger in comparison to the total horsepower of the motors, and the cost per horsepower is always higher for a small machine than for a large one.

When but one motor is to be used very perfect regulation may be obtained by taking current from an independent generator driven by a motor. The voltage of this current may be regulated to give any desired speed but the system is far too expensive for ordinary use.

There is also a special form of motor where the speed may be varied by moving the cores on which the field coils are wound near to or away from the armature. This is done by means of a hand wheel on the motor frame and requires some exertion to produce the movement, which is of course a disadvantage when speed changes are required quickly and frequently. The principle is somewhat similar to that of varying the current in the motor field but a greater range of speed is claimed by this means. The motor may in some cases meet all requirements and give excellent service.

The system installed in a shop may have a very considerable effect on its economy of operation as well as on the first cost and a very careful study of the exact requirements of the case in hand and of the ability of the different systems to fulfill them will be well repaid. It is the business of the skillful salesman to make his system appear the best for all purposes; the purchaser should be able to decide upon the relative merits of the different systems in regard to the case he has to deal with.

Cleveland Machinery Market.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, April 6.

Reports from Cleveland manufacturers are more favorable than they have been for several months. The improvement in the demand for pig iron and finished materials has extended to the products of the metal trades, and while there is a long stretch between the pace of today and that of a year ago, trade conditions are much more satisfactory than they have been. Some companies are making special efforts to extend their export business. Sales Manager Chase, of the National-Acme Mfg. Co., has just returned from an European trip and finds conditions favorable for the extension of the business of his company in foreign lands. Inquiries received by the National-Acme company recently have been on the increase. Secretary Henn states that, while business is neither stagnant nor booming, it is fairly satisfactory.

The Kirk-Latty Mfg. Co. is very well satisfied with trade conditions. It is securing a heavy volume of business and its factory is running full time. This company feels that the buiness outlook is very much more encouraging today than it was earlier in the year. The steady improvement of business conditions with it has been gratifying.

The Reliance Gauge Column Co. reports that for the past month business has been quiet but steady. It sees indications of more activity in the near future. It has made several renewals of yearly contracts and also a number of new contracts which will enable it to make a very satisfactory output.

The Interstate Engineering Co. reports that business conditions are very satisfactory.

The Hill Clutch Co. notes an encouraging increase of business within the past two or three weeks.

The Standard Welding Co. reports that the general conditions of trade, as reflected in its business, are at the present time fairly good. The slight increase in the price of iron has stimulated considerable activity in placing contracts for future supplies and it has at the same time given a stimulus to the trade, and while orders are not large, they are much more numerous than they have been any time within the last three months, and the inquiries are of a satisfactory nature. The company looks forward now to a very much improved condition over November, December and January, and if the spring opens reasonably well so the automobile and cycle trade will start in with energy, as it is sure to under favorable conditions, there will, in the opinion of this company, be very good business for the next two or three months.

The G. C. Kuhlman Car Co. is receiving a great many orders for city cars for early delivery and is having many inquiries for additional work. The shops of the company are gradually filling with workmen and the prospects for running full in a very short time are encouraging.

The Reade Machinery Co. states that there has been quite a noticeable improvement in its business during March. Inquiries for second-hand machine tools have not been very numerous, but there is the usual spring business in contractor's equipment, etc.

The Upson Nut Co. finds the outlook very satisfactory for a good average volume of business for the spring. The prices are responding somewhat to the demand and it sees no ominous signs.

Business with the Marshall & Huschart Machinery Co. has gotten to a normal basis. The month of March was satisfactory, and with the numerous good inquiries it has on its books the future looks quite bright.

WARNER TACHOMETER AND "CUT-METER."

In the issue of Jan. 7, *The Iron Trade Review* had some account of the recently patented device of the Warner Instrument Co., of Beloit, Wis., and we now illustrate the instrument in the form which the patent has assumed in practice. The "Cut-Meter" is a combination of tachometer and a wheel having a specified circumference, the tachometer being calibrated so that every foot traveled by the circumference of the wheel registers one foot upon the dial. For instance, if the circumference of the wheel is exactly one foot, it requires only one revolution of the tachometer shaft to register one foot. If the wheel is six inches in circumference, it can readily be seen that it will require two revolutions of the tachometer shaft to indicate one foot on the dial, so that it only remains to calibrate properly a tachometer in order to get the direct reading in feet per minute. Having these two facts as a basis, it appeared a simple problem to produce the cut-meter. But it was absolutely necessary to have a portable tachometer possessing the prime essentials of accuracy in any and all positions; the construction being such as would stand the necessary wear and tear without affecting the calibration. All other tachometers employ centrifugal force to operate the mechanism. In some instruments a weight is used which is opposed by a spring. This weight, by means of suitable gears, is attached to the hands which indicate the speed. In other instruments, liquids are used with

FIG 1.—THE CUT-METER.

an arrangement similar to a centrifugal pump, having a glass tube calibrated to indicate the varying heights to which the liquid rises, the height being, of course, dependent on the speed of the pump.

The inventors of the magnetic tachometers sought for something better on the ground that centrifugal force, as is well known, increases as the square of the speed, so that if a scale indicates a slow speed the divisions will necessarily become wider and wider apart as the speed becomes higher. This makes the range of the instrument very limited. The gearing between the weight and the indicating hand introduces considerable friction, tending to destroy the accuracy of the instrument, in fact, it practically renders it useless. Oiling the gearing will often change the reading very considerably. Any wear in the gearing destroys the accuracy and reliability of an instrument and, at best, the life of any instrument of precision with mechanically connected parts is very short. Owing to the shape of the weights, it is impossible to balance the moving parts for more than one position, consequently, the instrument can be correct in one position only. There is also a continual vibration of the indicating hand, making it impossible to read the instrument with more than approximate accuracy.

In the Warner tachometers and cut-meters all of these objections are met and the following description will explain the neat construction of the device shown in Fig. 1. Fig. 2 shows a cross section of the instrument. The magnet C is carried by the ball bearing B. The outside of B is threaded, screws into the outer case A, is secured by a spring washer, and can be turned only with a specially-shaped wrench, as it is not intended to be moved except by the makers. In front of the magnet is a soft steel ring D, which deflects the lines of force through the aluminum disc G. This disc is mounted on a hardened steel shaft supported by the jewels J. On the outer edge of the aluminum disc are engraved the figures indicating speed. The shaft has a hair spring H to resist the turning of the aluminum dial and bring it back to the zero point when the magnet is at rest. The jewel bearings and the steel ring are carried by the inner case E, which telescopes into the outer case and can be removed at will. The inner case also serves the purpose of protecting the dial G from air currents set up by the rotating magnet. An opening in the outer and inner case is covered by a glass K, through which the figures on the aluminum dial can be read. Attached to the main shaft is the driving wheel or disc L, of proper diameter, having a hollow or gutter-shaped periphery, into which is snapped a miniature rubber tire M.

The lines of force flow from the north pole through the aluminum dial G to the steel plate, and back again through the dial to the south pole of the magnet C. When the magnet

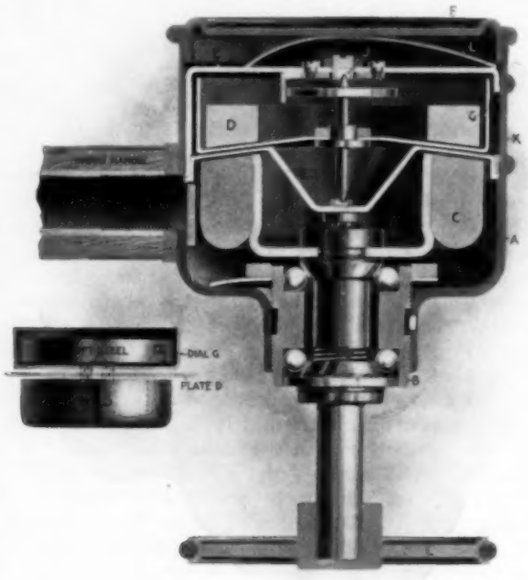


FIG. 2.—THE CUT-METER IN DETAIL.

rotates it sets up an accessory action in the dial G, this drag being in proportion to the speed of the magnet, and as the hairspring is subject to the same law, it is evident that increasing the speed of the magnet will increase the displacement of the dial in exact proportion. The dial or scale can therefore be marked by equal divisions from the lowest to the highest reading. As the adjustment of the magnet closer to the steel ring increases the torque, or dragging effect, it is only necessary to select a hairspring of suitable stiffness and then rotate the magnet at a known speed, at the same time adjusting the ball-bearing until the scale indicates the correct rate. The instrument will then be accurate over the entire range of the scale and will remain so permanently, there being no necessity for subsequent adjustment or recalibration. As there are no mechanical connections between the magnet and the indicating dial, and as the magnet runs very easily (there being always an abundance of power to drive it) there can be no possible inaccuracy up to this point.

The indicating dial is mounted on a steel shaft, the points of which are hardened and supported in sapphire jewels, practically eliminating all friction or retardation. How perfectly this is accomplished can be judged from the fact that a change in speed of one-fifth of 1 percent is shown on the dial. It must not be understood because the disc is mounted on jewels that the instrument is a delicate one requiring careful handling. As

the dial and shaft are very light, the strength of the jewels and pivot is very great in comparison to the weight, and experience has shown that they will stand the regular service of any ordinary machine shop.

The instrument is sufficiently small and light so that it can be carried in the pocket without inconvenience. It presents a very handsome appearance, being substantially constructed of brass and nickel plated. The handle is turned from a hard tropical wood and is highly polished.

The machine shop manager who tests every machine in his factory will be surprised at the results and will be astonished at the great difference between what he supposed his cutting speed to be, and what the instrument shows. He will find in 90 percent of tests that working speeds are from 25 to 50 percent slower than they ought to be for the most profitable results. The experience of the inventors has been that most modern shops have one or two tools which are doing excellent work, but that the average cutting speed of the tools throughout the shop is not nearly so good. They recently inspected a factory which was equipped with modern machinery and motor driven by the multi-voltage system so that the cutting speed could be instantly brought to anything desired. This factory had one tool running on soft steel at a speed of 159 feet per minute, but the average speed through the entire factory on the same stock was about 24 feet. On another occasion they inspected two boring mills of the same make, working on the same stock.

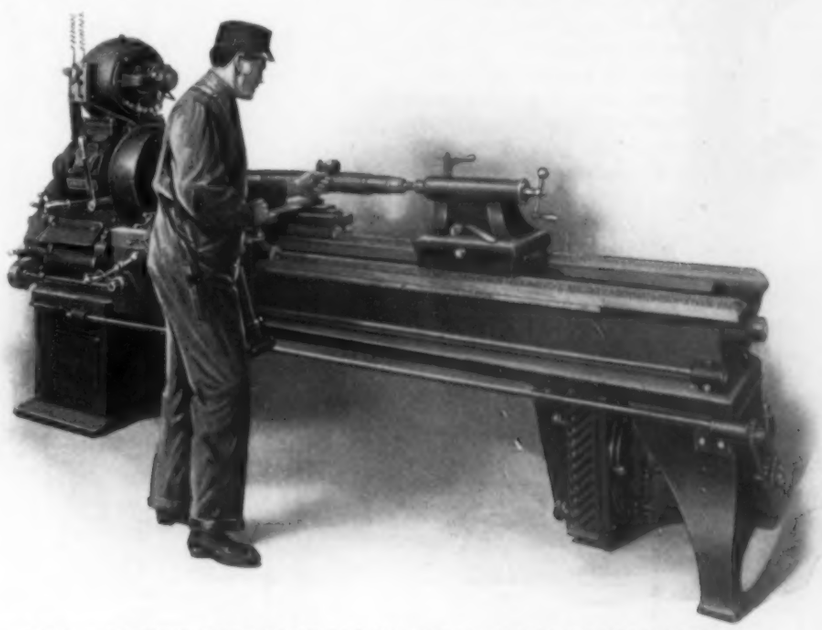


FIG. 3.—DETERMINING THE SURFACE VELOCITY OF LATHE WORK BY THE CUT-METER.

The speed of one of the mills was 160 feet, and the other 22 feet, the cut and feed being practically the same in both cases. Superintendents have told them that they could determine cutting speeds by the eye, and while they were talking would look directly at work which was running at not more than one-fourth the speed they *guessed* it was running. There is no guess work about the Cut-Meter. It indicates the cutting speed instantly, accurately, and with dead-beat register. It is really surprising what wild guesses even experienced machinists will make on the speed of cutting tools, and they are apt to run small diameters too slow though proportionately large diameters are run faster.

Fig. 3 shows a machinist determining the peripheral speed of lathe work, and Fig. 4 illustrates the operator of a radial drill at a similar task. The instrument is equally useful on planer beds and other tools where a knowledge of cutting speeds is highly desirable.

One of the most important parts of the instrument is the bearings. After considerable experimenting, it was decided that ball bearings were best adapted for this service, as they required very little oil, and the wear is reduced to a negligible quantity. The material used is a superior quality of soft steel, which is first finished to shape and then case hardened. Each piece is ground on a specially constructed machine, so that every part may be true and in perfect alignment. After being ground, each part is carefully tested, and imperfect or soft pieces discarded. Several of these bearings have been run at a speed of 15,000 r. p. m. for a sufficient length of time to equal several years' actual work on the instrument. At the end of this crucial test, the bearings were found to be in perfect condition.

The air gap of the magnet is only 1-32 inch, or about one-half of 1 percent of the entire length of the magnet. This narrow air gap effectually prevents the instrument from being influenced by exterior magnetism and the strongest field does not affect the accuracy. The steel is of special quality and is made to order. The pieces are first hardened, magnetized, and then aged by a process which prevents further change in strength. They are carefully tested and laid aside for a considerable interval before retesting. If they show the slightest loss of strength the magnet is discarded.

Tachometers.

The firm expects to put a complete line of tachometers on the market. These will be calibrated to operate in both directions, and will be equally serviceable in horizontal or vertical positions. They will be constructed for operation at all speeds from 190 to 25,000 r. p. m. It will be observed from an examination of Figs. 1 and 2 that the scale is much longer than one would expect on so small an instrument. With an outside diameter of only 2¼ inches, it is possible to give a scale length of a trifle over six inches.

It has developed that of the $55,000,000 in stock of the Pacific Steel Co., which it is asserted has been subscribed, all but ten shares of $100 each were subscribed for by C. W. French, the promoter of the enterprise. General Otis and nine other men subscribed for one share each. Mr. French explained that the amount of stock which was in his name was the actual amount which had been sold, and it was taken in his name merely to facilitate incorporation. He stated that it would soon be allotted to many men and interests. Who these men or what these interests are he would not say.

The Mahoning Motor Car Co., Youngstown, O., has been organized and the following officers have been elected: President, L. E. Cochran; vice president, W. J. Hitchcock; secretary, D. E. Webster; general manager and treasurer, W. P. Williamson. The following directors were elected: L. E. Cochran, W. J. Hitchcock, J. B. Kennedy, W. H. Beuchner, W. P. Williamson, D. E. Webster and G. C. Nixon. It is expected that the company will have motor cars on the market within 90 days.

THE REBUILDING OF BALTIMORE.

Concerning the delay in the placing of contracts for the rebuilding of the burned district of Baltimore, C. W. Wheelock, general manager of the Engineering Co. of America, who had made a study of conditions in that city, said:

"The leasehold system prevails in Baltimore to a greater extent than in any other American city with which I am familiar. A considerable proportion of the buildings recently destroyed by fire was leasehold property. What is the result? The tenant, to whom the building belongs during the life of his lease, has received his insurance money and is, in most instances, financially able to rebuild. But if, as in many cases, his lease has but a few years to run, he is loath to build an expensive structure, which will revert to the landowner on the expiration of this lease. He cannot, under the new building regulations, erect a cheap and flimsy structure. What follows? Before contracting for a new structure he enters into negotiations with the owner of the land for a readjustment of the terms of his lease—either an extension or the insertion

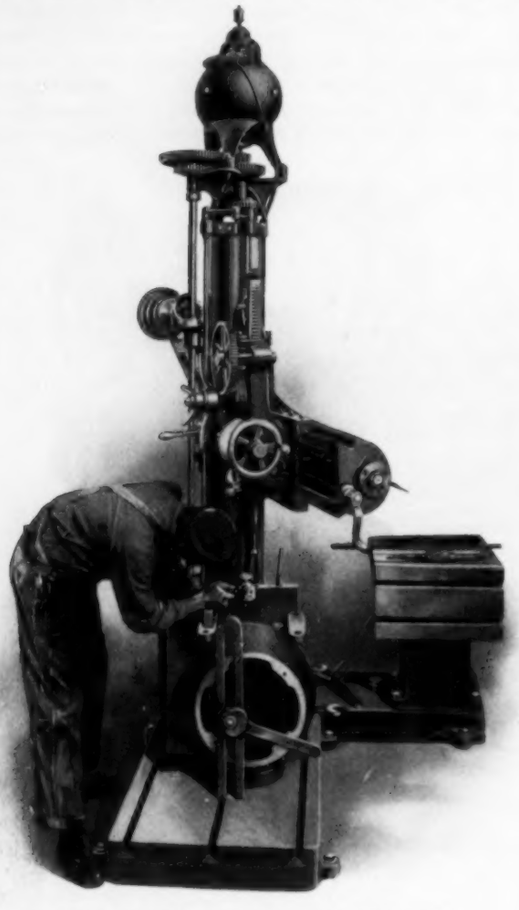


FIG. 4.—THE CUT-METER IN USE ON RADIAL DRILL.

of a provision calling for the purchase of the building at an appraised valuation at the expiration of the lease. In many cases the land is owned by a number of heirs, some, perhaps, not in this country. Other estates are held by minors and are in the hands of trustees, slow to change the conditions of their trust. Thus delay ensues, lawyers are called in by both sides and Baltimore rises not from the ruins. All such questions will, of course, be adjusted in time, but delay is expensive."

It is understood that the general contractors of the Pennsylvania tunnels are endeavoring to have foundries revise their bids on castings, and that the foundries in turn are asking blast furnaces for concessions on pig iron. It is expected that the sub-contracts will be let at an early date.

The creditors of the Chattanooga Furnace Co., Chattanooga, Tenn., have elected J. T. Hill trustee.

WHEELER COAL AND GAS-FIRED BOILERS.

Recent literature of the Wheeler vertical water tube boilers is interesting for the details given of two designs, one using coal and the other blast furnace gas as a fuel. The coal-fired boiler with the outside combustion chamber may be equally well adapted, by changing its setting, to the use of blast furnace gas as a fuel, the difference between the coal and gas-fired boilers being in the size of the combustion chamber and the baffling of the tubes. The former consists of an upper and lower tube drum, 44 inches in diameter, connected by six rows of 4-inch tubes, 22 feet long. Above and parallel with the upper tube drum are two steam drums, one above the other, the lower steam drum being connected with the upper tube drum by two 8-inch cast steel nozzles. Directly above these con-

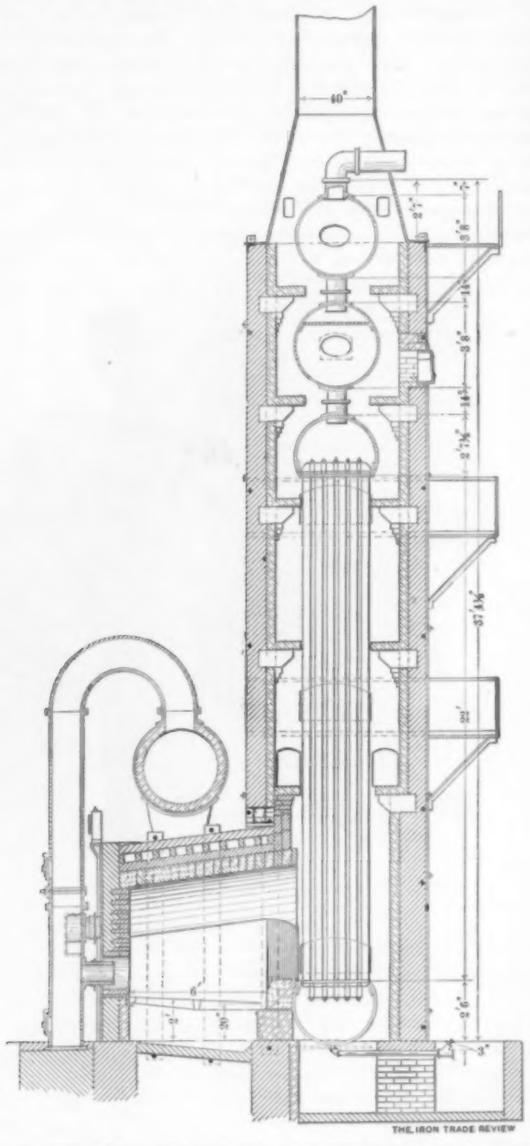


FIG. 1.—VERTICAL CROSS SECTION OF WHEELER BOILER, WITH EXTERNAL COMBUSTION CHAMBER, ARRANGED FOR BLAST FURNACE GAS.

nections the upper steam drum is connected with the lower by two 8-inch steel nozzles, and in the center of the upper steam drum is a cast steel nozzle for steam outlet. In the lower steam drum at each end, between the openings for the lower and upper nozzles are solid baffle plates which cause the steam to travel around the ends of these plates and come in contact with the hot surface of the drum. The boiler is enclosed in 14-inch brick walls. The form of brickwork is rectangular, with angle iron on each corner and binding rods at each side, clamping and binding the setting together.

There is an external combustion chamber, the crown of which is one foot lower in front than at the tubes. The crown of the combustion chamber extends up against the tubes, which are in straight rows with two and one-half inches between the

rows across the tube drum, forcing the heat among the tubes and a part of it into the chamber beyond, where it is caught by the first pair of baffles and all brought in among the tubes. The second and third pair of baffles hold it in among the tubes until it reaches the upper tube drum and is caught by the baffles between the tube drum and the lower steam drum, and thrown under this drum, passes around the drum, is again caught by the baffles between the two steam drums, and thrown under the upper steam drum, after which it passes around this drum through the smokestack. At each end of the boiler are placed doors in the brickwork through which all the tubes may be reached and soot and dirt blown off. Dust which gathers on the lower drum may be blown into the chamber beneath the boiler where it remains until boiler is off to be cleaned, when it may be removed through the openings in the foundation for that purpose. Platforms at the back of the boiler, one at the top under the steam line and one extending under each of the two upper doors, are provided for blowing the dust off the tubes. At the top of the boiler resting on the brick-

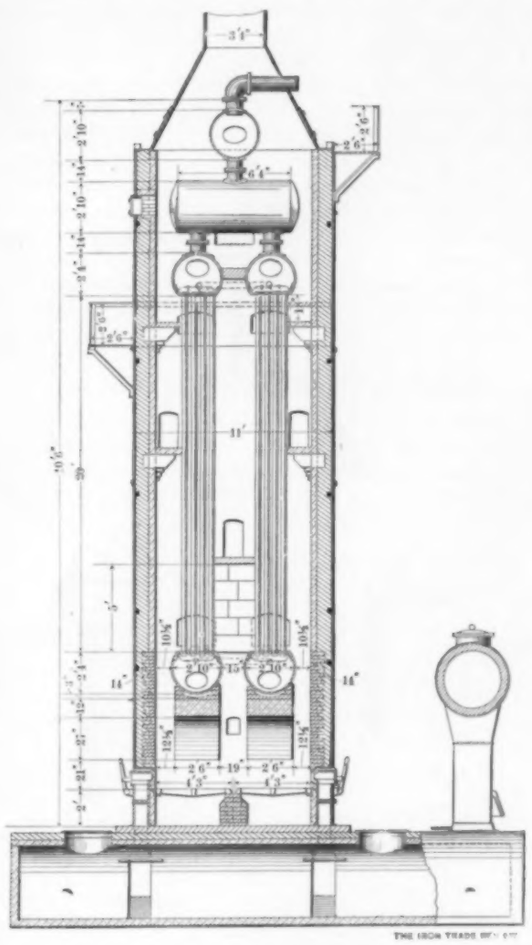


FIG. 2.—VERTICAL CROSS SECTION, WHEELER BLAST FURNACE BOILER.

work is a hood made of plates, the bottom of which is flanged out to rest on the brick setting, and is securely anchored to the angle iron at the corners of the brickwork, holding the hood and stack in place without the use of guy lines. The flat surface of the tube drums is reinforced between every row of tubes with a cast steel crown bar bolted to the tube plate with crown bar bolts, the longitudinal seams being double riveted, and the boiler is constructed throughout for a pressure of 165 pounds.

For gas firing, the crown of the combustion chamber of the coal-fired boiler and the first baffle in the wall opposite the combustion chamber are kept back from the tubes, thereby giving more room for the volume of heated gases, which by the time they have reached the second pair of baffles, have been sufficiently reduced in volume to insure that the space among the tubes is large enough to take care of them without choking the boiler. For the use of gas this boiler is equipped with triple gas burner, the same form being used for either overhead or underground flues. This burner allows the boiler to be fitted with full grate surface for coal firing.

The Wheeler blast furnace boiler consists of two sections, each having an upper and lower tube drum, connected by four rows of 4-inch tubes. The two sections are 15 inches apart between the tube drums, and 23 inches between the banks of tubes, and are connected at the ends of the tube drums with 4-inch circulation pipes, at the upper tube drum below the water line, which maintains the water in the two sections at the same level. At the top of the two sections, parallel to each other and at right angles to the tube drums, are two steam drums. They are connected to the tube drums with four 8-inch cast steel nozzles. Above the centers of these drums and at right angles, connected by two 8-inch steel nozzles is a third steam drum. An 8-inch cast steel nozzle for steam outlet is in the center of the top of this drum. This boiler is enclosed in rectangular brickwork similar to the coal-fired boiler. The combustion chamber is directly under the boiler. The ends of the four tube drums extend through the brickwork and the whole weight of the boiler is carried by the lower tube drums which rest in cast iron saddles on the end walls of the brickwork. Under each of the lower drums and over the combustion chamber is a brick arch 12 inches deep and 30 inches wide, built to a radius of 6 feet 3 inches, the ends resting in the end walls of the setting. On top of the arches the brickwork is built up to within an inch of the bottoms of the drums, and at the sides of the drums up to and touching them. These arches protect the drums from the heat of the furnace and reflect their heat back on the combustion chamber, increasing the temperature and assisting combustion. At each side of the combustion chamber there are two gas burners with one double coal firing door between them. The burners may be connected with overhead or underground flues. Between the two sections and resting on the lower drums one foot apart are brick baffle plates on edge, five feet high, on top of which is a solid brick covering. On each side of the boiler, at a point about eleven feet above the lower drums, and eighteen inches below the upper tube drums are brick baffles closing up the entire space between the walls and tubes. The space between the sections at the upper tube drums is closed with special shaped brick. The hood and its setting is similar to that of the coal-fired boiler.

W. W. Shilling, of Sharon, Pa., is sole agent for the Wheeler boilers.

Fred W. Blackmer and Henry F. Harris have been appointed receivers of the William Allen & Sons Co., Worcester, Mass. The concern is the oldest boiler manufacturing company in Worcester, having been established in 1847. Liabilities are placed at $40,000 and assets are not stated.

Suit has been filed in the United States Circuit Court, Cleveland, by the Morgan Engineering Co., of Alliance, O., against the Alliance Machine Co., of Alliance, alleging infringement of patent on an electric overhead traveling crane. Adjustment of damages is asked.

Gehret Brothers, proprietors of the Ornamental Iron Fence & Wire Works Co., at Bridgeport, Pa., are meeting with much success with their lawn fence, which is made of heavy crimped steel wire, galvanized, 3-16 of an inch thick, 3-inch diamond mesh, 1 by ½-inch steel channel. The frame is set on heavy cast iron fence posts.

The capitalization of the Rapid Heater Co., Grand Rapids, Mich., has been increased from $30,000 to $60,000. The original capital has been paid in and half the increase subscribed. Additional money is needed for extensions of the business.

The board of public works, Nashville, Tenn., has awarded the United States Cast Iron Pipe & Foundry Co., Chattanooga, Tenn., the contract for furnishing water pipe to the city at $21.50 per ton. The amount of the contract is $10,000.

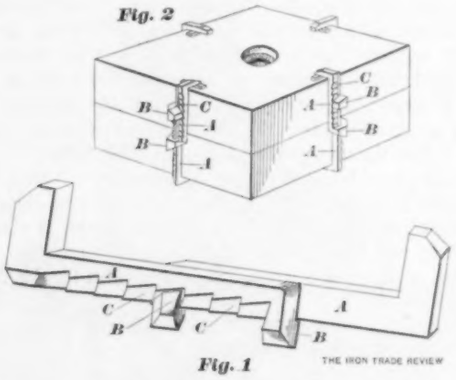
The Maryland Steel Co. has far enough advanced with the order for 20,000 tons of rails for a railroad in Syria, Turkey, to charter steamers to take the first cargoes.

Some New Things for the Shop, Chiefly by Way of the Patent Office.

A Flask Clamp.

There is something highly attractive about the simplicity of the clamp invented by George W. Soule, of Meridian, Miss. The clamp is of a very convenient elasticity within its range and the two halves being identical any two can be picked up from the molding floor or the supply bin at random and the combination will form a working pair. The invention, as has been suggested, relates more particularly to that class of clamps which are used by foundrymen for fastening the sections of flasks but are also serviceable for other purposes. For molders' use the clamp consists of two parts only and these may be duplicates of each other. They may be ordinary castings and need no machine work or other finishing unless it be cleaning in a tumbling barrel.

Fig. 1 is a view of the two members of the clamp in perspective as they are combined for use. Fig. 2 is a perspective view of the clamp applied to a flask. At one end of each half of the clamp is a jaw extending at right angles to the shank A. At the other end of each member there is an arm projecting rearward and then laterally to the plane in which the body A and the jaw lie. The two members have their sides partially overlapping and with their front faces in the same plane, the arm B of the one member reaching across and engaging the



AN INEXPENSIVE CLAMP.

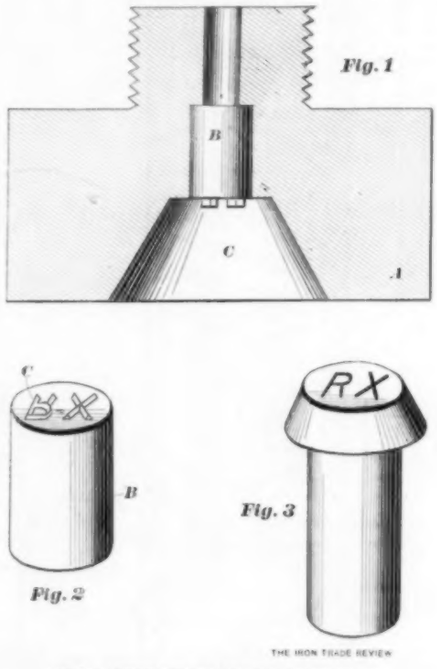
back of the other member. The back of each half of the clamp has a beveled face and the arm B is directed forward and outward accordingly. The arm partly embraces the body of the neighboring member and this has a series of notches C to receive the arms. These notches are equally spaced in the engravings so that each of the arms may rest at the same time in a notch. The two members then hold against longitudinal movement on each other and the clamp can be applied to the flask and secured in the usual way by wedges. The length of the clamp may be varied by placing the arms into different notches. The notches C are made oblique to form ratchets so that there is no resistance to the movement of the members over each other in the proper direction to cause the jaws to approach one another.

The duplication of the halves of the clamp is another advantage and renders it feasible to make a complete clamp or any number of clamps by casting from a single pattern. It also follows that two members which are duplicates except as to length may be combined to form a clamp. The inventor suggests the convenience of having approximately equal numbers of clamp castings of two different lengths. Then from the stock of castings the molder can readily assemble clamps of three different lengths—first, by combining two short members, second, by combining a short and a long member, and, third, by combining two long members. Many foundries are equipped with columns ranging from 8 to 24 inches and these vary every 1 inch in length. This demands a large number of non-adjustable clamps to meet different requirements.

The clamp may be improved for the patternmaker and carpenter by drilling and tapping one of the jaws which may be strengthened for this purpose, and fitting a screw to the hole in line with the shank of the clamp. The end of the screw can be enlarged in the usual manner common to clamps for woodworking.

A Rivet Discovery.

Julius E. Rettig, of Reading, Pa., has secured a patent of considerable breadth in reference to the marking of rivets. He proposes the invention as being more particularly connected with such rivets as are used in securing plates together. There is an advantage in being able to identify the rivets of any special manufacture after they have been put in place and it has been the practice to shape the rivet heads by a die which produced a raised mark on the surface. The inventor asserts that this mark is mainly composed of the scale formed on the outside of the rivet which is squeezed up into the cut in the header and this drops off when the rivet is hammered up in the structure and thus the matter of identification is impaired



THE PATENTABLE MARKING OF RIVETS.

if not altogether lost. The patentee proposes to change the method and sink the letters into the rivet instead of having them project.

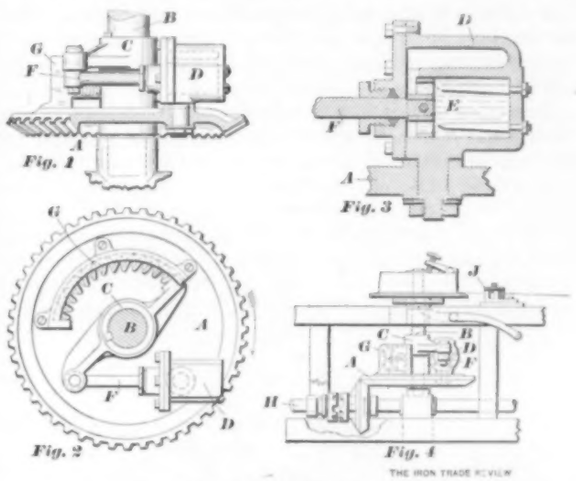
The invention will be understood by an examination of the illustrations. Fig. 1 shows a header in section with the stamping plug inserted in place. Fig. 2 is an inverted perspective view of the stamping plug and Fig. 3 is a perspective view of one of the stamped rivets. The header A is screw threaded to fit the press and has a shoulder to abut against the face of the socket. The header has a tapered opening with flat top for shaping the rivet heads and is counterbored for the plug B which is inserted from underneath. The plug fits the bore snugly and can be backed out by inserting a drift in the bore of the header. The bottom of the plug has the raised letters at C constituting the mark. These characters may be the letters "RX," for example, as given in the engravings. The rivet head is inserted in the chamber and the header pressed down to form the rivet head and at the same time causing the raised characters at C to form "intaglio-marks" in the driving face of the head. The specifications wind up with the claims of the inventor to a "rivet having an intaglio character or characters on the driving-face of the head thereof," and "a rivet

having a character or characters impressed into its head below the driving surface thereof."

This may be patentable from the Washington point of view, but it does not seem essentially different from the common practice of marking metal with a steel stamp. Many a scale, by the way, has been seriously damaged by the owner stamping his initials or even his name on the inviting surface. The mark was then sunk, "impressed," or in "intaglio," and such lettering for the very purpose of identification is the every-day practice of the shops. The sunken letter from a steel punch is indeed much more common than any other type of letter, with the one exception of rivets, and rivets have not been so generally punched "intaglio" on account of the greater convenience in header construction and there may be other reasons. Some inquiry has been made of a number of rivet manufacturers and they assert there is nothing novel in the plan. One manager writes as follows: "We do not think that a patent of this kind will hold. Rivets have been marked both ways, with raised and sunken letters, for a great many years, and the trade marks used by the different rivet manufacturers have not been infringed upon by other manufacturers for the simple reason that manufacturers do not see any advantages gained therefrom. You could get a copyright or trade mark issued by the Government which would be protected. We do not see where a man should get a patent for the marking of rivets any more than you can get a patent for the making of the same." Another maker of rivets says that the making of rivets with a sunken letter is more troublesome than bringing up the mark in relief, but in either case it is no new thing. "We have seen bolts and similar goods marked with sunken letters here tofore and there is neither originality nor invention in the patent to which you refer, nor should in our opinion any such patent ever have been granted." All of which would seem to be conclusive that patentable and valid do not invariably mean the same thing.

Relief Mechanism for Wire-Drawing Machines.

This device is for the purpose of preventing sudden strains or shock upon the mechanism of wire-drawing blocks and other machinery and avoids the jerking pull upon the wire when starting the machine at work. The arrangement has



GETTING AN ELASTIC DRIVE IN DRAWING WIRE.

been patented by Carl G. Tideman, of Worcester, Mass., and Fig. 1 shows a side view, partly in section, of a relief mechanism embodying the invention, Fig. 2 is a plan view and Fig. 3 a vertical section through the resistance cylinder and piston drawn to somewhat larger scale. Fig. 4 depicts the relief mechanism in combination with the wire-drawing block and the driving shafts.

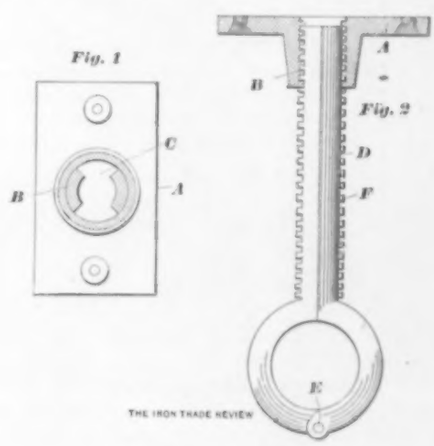
The design comprises a gear A and shaft B, the former turning loosely on the shaft. Either may be the driving element, but for the purpose of the present description it is assumed that the direction in which power and motion are transmitted is from the gear to the shaft. C is a hub with arms near to the gear A and firmly keyed to the shaft. The resistance cylinder D is pivoted on the gear and freely oscillates in relation to the wheel. A wrist pin on the bottom of the cylinder fits in a bearing in the web of the gear and is held by a nut on the threaded end of the pintle. The piston chamber E has a supplemental chamber shown on the upper side, the two being connected by a bypass near to the cylinder head. The piston slides in the cylinder at E and has a rod connection with the arm F of the crosshead C. The piston has holes registering with tapered pins fastened in the end of the cylinder. When in use the cylinder E is filled with a liquid, as oil, and the supplemental chamber affords space for a moderate amount of air and space for oil as forced from the chamber by the advancing piston.

The spring resistance G consists of a segmental guard attached to the gear A, with a cradle and abutment for the spring. The combination exerts force against the crosshead C in a direction for drawing the piston toward the end of the cylinder and retaining the parts at the normal idle position. The upright shaft B has at one end the draft block J and the gear wheel is driven by a piston on the power shaft H. When the clutch is thrown in for starting the mechanism the force of the power movement carries forward the gear A, while the inertia of the driven members and strain of the wire from the die J acts as an opposing force through the shaft B and the crosshead. The force thus exerted tends to press the piston inward against the body of oil in the chamber and also compresses the spring. The oil passes through the holes in the piston and a resistance is afforded which though slight at first greatly increases in amount as the tapered pins obstruct the passages. When the piston strikes the end of the cylinder the power is transmitted by a positive unyielding motion as long as the force is greater than the spring tension. When the clutch is thrown off, the piston is returned by the pressure of the spring on the gear and crosshead arms.

A Pipe Hanger.

Thomas Fee, of Brooklyn, N. Y., has received a patent on a pipe hanger made in hinged sections and capable of vertical adjustment. Fig. 1 is a horizontal section through the sleeve of the plate and Fig. 2 is a side elevation of the device showing the parts in their relative positions and the plate in section.

The plate A has screw or bolt holes for attachment to the ceiling. A sleeve depends from this plate and has grooves B,



AN ADJUSTABLE HANGER.

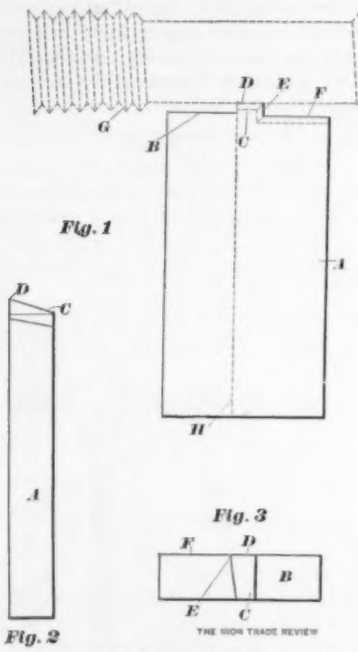
through which pass the teeth on the threaded stem. The stem D is split into sections, each having a semicircular part, and hinged at E. The two halves of the stem have rows of teeth F to be received in the spaces C when inserted in the sleeve and when the stem is partly rotated after verical adjustment these engage the screw B. The clear openings will facilitate the assembling of pipe and hangers, a task which is not the most congenial of occupations.

Trimming Stay-Bolt Threads.

This device primarily is intended for trimming stay bolts for boilers, but may serve for the removal of surplus metal from studs or shafts, screw threaded or otherwise. Any toolmaker deciding to use the uncut surface of the rotating work as a stop for the tool, either in a lathe or some other machine tool, would be likely to infringe upon the patent allowed to William E. Corkrey, of Brainerd, Minn. There is but a single

claim, but it has great scope: "A cutter tool provided with a blunt gauge or stop upon its forward end, the cutter portion projecting forwardly beyond the said stop and having a cutting edge upon its forward end and upon its side opposite the said stop." Toolmakers do not depend upon the surface of the work as a stop because the truth of the circumference is an uncertain quantity in size and concentricity, but for stay-bolt trimming this will not so evidently apply.

The tool is seen in plan in Fig. 1, Fig. 2 is a side view and Fig. 3 is a front view looking toward the edge. A is the shank of the tool, which is made of a rectangular piece of steel. This shank has a projection C at the middle part which has a cutting edge D at the front and another cutting edge E at the side. There is a stop or gauge shoulder B on the front edge of the shank on the opposite side of the projection from the edge E. The part F is slightly in rear of the plane of the gauge shoulder B and clears the tops of the threads when the gauge meets them. The plate is extended at F to give stiffness to the projection C. A portion of a stay bolt is seen in dotted lines at G. The stay bolt is rotated in the usual manner and the tool is fed up to the work. The cutting edge D trims away the threads until the shoulder at B meets the tops of the threads, then the tool is moved longitudinally and the surplus threads are cut off by the edge E. The dotted line H in Fig. 3 shows the junction

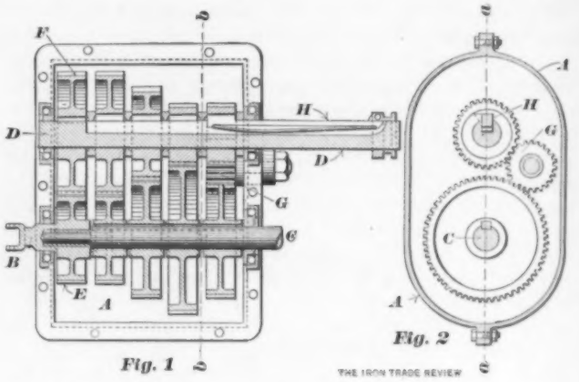


A TRIMMING TOOL PATENT.

of the gauge with the cutting portion of the tool. When the tool is made of a single piece of steel the gauge shoulder is ground away as the cutting edge wears back. When the tool is made in two pieces the portion which forms the gauge is slid back in proportion to the wear or waste of the cutting edge at D. The tools may be secured in a bolt cutter die head and employed for the purpose named.

A Variable Speed and Reversing Gear.

A variable speed and reversing gear, which has been applied to several touring cars of 3,500 pounds, is the invention of Henry R. Bevier, of Grand Rapids, Mich. A horizontal section of the device is shown in Fig. 1, taken on the line a-a of Fig. 2; and Fig. 2 is a vertical section taken on the line b-b of Fig. 1. The case A encloses the gearing and B is a driving shaft with one end outside the case and connecting with the motor, and on the inner end of this shaft is fastened the gear E. The driven shaft C is in alignment with the shaft B, the end of the one being reduced and fitting in the end of the other in a suitable bearing. A series of gears of different sizes are fixed on the shaft C. The countershaft D is also journaled in the case A and parallel with the shaft C. A gear F engages the driving gear E and the countershaft D is thus driven at a constant rate and turns a series of gears which engage with corresponding gears on the shaft C. The last gear in the series at the extreme right of the countershaft D inside the casing does not engage directly with the corresponding gear but drives it through an idler G, and when these gears are in operation the rotation of shaft C is reversed. A keyway is cut in the shaft D and fitted with a sliding key H. This has a projection to enter a suitable keyway in each of the gears on that shaft. The key and shaft



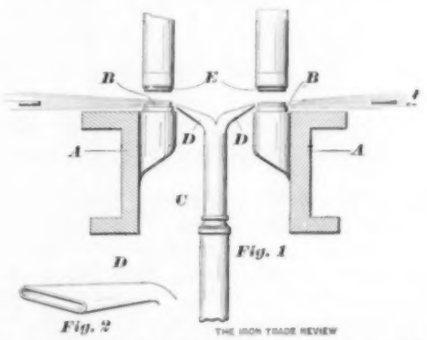
CHANGE GEAR WITH VARIABLE SPEED AND REVERSING COMBINATION.

extend beyond the case and connect wih a sliding collar. The key H is held in engagement with the gears by a spring and to prevent engagement with more than one gear at a time they are separated by loose collars which engage the inclined ends of the key and depress it in passing from one gear to another.

Pneumatic Attachment to Presses.

The value of air, compressed much or little, is being very generally ascertained in the shops and it is used for other service than the driving of drills and hammers. As a cooling agency it is applied to cutters and does not make the mess created by other things, liquids in particular. Maybe this is not the most economical way of using it, but then a mechanic is not above using it for cleaning off chips from places where he may have no time or inclination to apply a brush and if it saves his time, well, air costs less than labor of the highly skilled type.

Something of this idea was in the minds of John G. and Martin O. Rehfus, of Philadelphia, when they designed the air propelled means of getting the product from forming dies. The scheme has doubtless developed in connection with the making of tin can tops and bottoms and concerns an air-supplied tube with a couple of branches directed in opposite directions against the edges or flanges of the discs as they are formed by the dies. Fig. 1 is a side elevation of the cutting dies with the nozzles of the pneumatic tube, and Fig. 2 is a



SHEDDING PRESS PRODUCT BY PNEUMATIC PRESSURE.

detail view. The bed A of the press supports the dies B and E. The mechanism for stripping the formed discs from the dies is not shown but it is assumed that after the cutting and forming process the product is released from the dies by any convenient means. There is a pneumatic pipe C between the dies and this has branches D bent in opposite directions and pointed at the pair of dies.

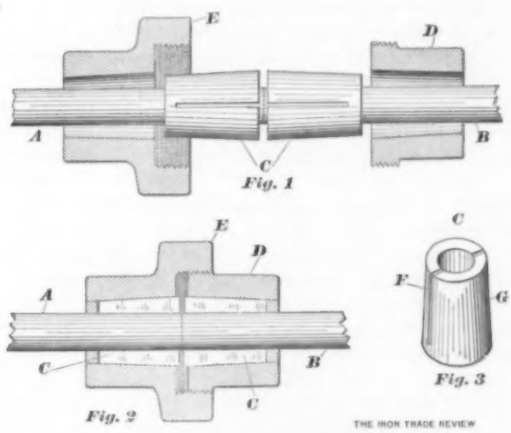
When the disc has been formed and released from the dies

and the flanges turned around the edges of the disc, a current of air is directed against the disc and it is blown from the dies into chutes or other receptacles. The essential feature of the invention, according to the patentees, is the provision for "a constant pneumatic current through the pipes for the purpose of instantly removing the disc from between the dies after the disc has been formed and released from the apparatus."

There is one branch of industry about which little is written of a purely technical type. Once in a while something leaks into print, but as a rule the technicalities of the business are secreted as closely as the construction of the cup defenders of the yachting world. The manufacture of jewelry is of this kind and few indeed are the shops giving a cordial invitation to the stranger to come in and become acquainted with matters mechanical, chemical or otherwise. The manipulation of metals as carried on in these establishments is of a decidedly interesting character, as anyone may readily realize by a comparison of some of the low priced novelties of the stores. These require much ingenuity to bring the cost of production within profitable limits and the appliances are not publicly exploited. An Eastern mechanic with a genius for this class of work, the production of ornamental metal, has asserted that in his many years of business no one but an employe ever was in his shop. The writer is therefore of opinion that some general acquaintance with what is being done in this direction would unearth devices thought to be novelties elsewhere. Certainly there is one factory in Rhode Island making collar buttons with pneumatic accessories. The collar button bottom is blanked from the sheet stock and flanged ready for beading over the post support. These pieces are small and difficult to handle, as any wearer of a collar button can understand. A jet of air is blown at the die and as the piece is ejected the jet carries it out of the way in readiness for the next operation. This prevents the littering of the dies and die-dishes with the product, deposits the parts in bulk in boxes where they may be easily handled and is a direct saving of time, labor and stock, exactly as in the present patent for handling tin can tops and bottoms.

The Coupling of Shafts.

A neat shaft coupling has been designed by Duncan S. Sinclair, of Wiarton, Canada, and the construction avoids the use of bolts or keys. It has the disadvantage of being unsuitable for shafts which do not turn invariably in the one direction, but as most coupled shafts do not come in this category, the coupling may be found useful. Fig. 1 is a sectional elevation showing the parts disconnected, Fig. 2 is



A NEAT SHAFT COUPLING.

a longitudinal section with the parts connected, and Fig. 3 is a perspective detail of one of the sleeves. The shafts A and B have on the adjacent ends a split and tapered sleeve C. These sleeves are split in a peculiar manner, familiar to many mechanics as the way in which expanding sleeves for lathe mandrels are cut. A cut F is made through the sleeve from one end almost to the other. A similar cut G at right angles to the first is made for the same distance from the other end of the sleeve. The sleeve is thus compressible and at the same time the parts are held in working position relative to each other. The male and female couplings D and E are tapered internally to correspond with the sleeves C and are threaded.

The screw threads of the coupling members are cut right or left handed, according to the direction in which the shaft will rotate. The sleeves are placed in position as in Fig. 2 and the muffs placed over them and screwed together, compressing the sleeves against the shaft. This frictional grip will tighten up the coupling as the shaft is set in motion and power transmitted.

A Self-Centering Chuck.

The halftones, Figs. 1 and 2, illustrate the product of the Self-Centering Chuck Co., of Bluffton, O. This device was mentioned in these columns when patented, but the manufac-

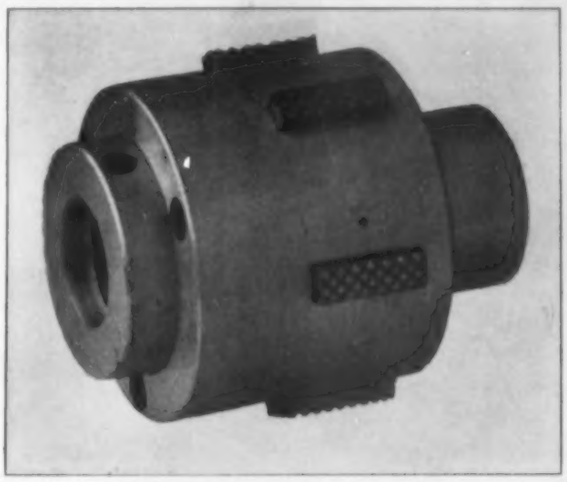


FIG. 1.—A SELF-CENTERING CHUCK FOR BUSHINGS, NIPPLES, ETC.

tured form will be of some degree of interest. The illustrations depict the tool as ready for placing on the threaded nose of the lathe or any similar tool, and Fig. 2 shows the details of the mechanism with the wrench. The chuck is made especially for holding cylinders, pipe, nipples, rings or any hollow piece for outside working. Light tubing can be held firmly as the smallest chuck has six jaws. The work is released by a backward movement of the lathe and on the contrary the heavier the chip the tighter the grip. The tool is wholly enclosed, three surfaces of the work can be finished without resetting the work and lathe carriage will allow travel to headstock without bent cutting or threading tools. The jaws are

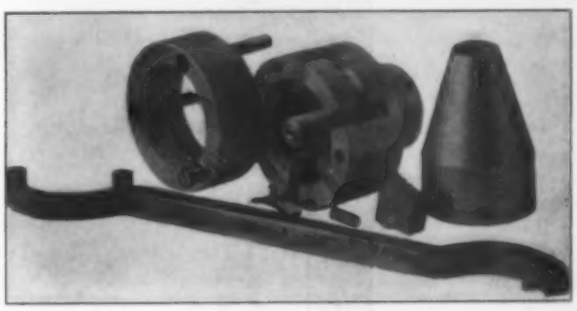


FIG. 2.—PARTS OF SELF-CENTERING CHUCK.

forced out by a tapered cone, seen in Fig. 2, and are returned by springs as the cone is moved in an opposite direction.

Power Hammer.

A hammer for use with steam or compressed air has been recently patented and is manufactured by the inventor, Charles E. Billin, of Chicago. A special valve movement and treadle for handling these hammers has been designed. It is so arranged that a slight movement of the treadle causes the ram to rise to top of its stroke and remain there for any length of time desired, thus enabling the operator to adjust work or tools on the lower die. If the treadle is then pressed down to the limit, the ram will give a hard, full blow, the same as a drop hammer; or the treadle can be pressed down part way, when the hammer will give repeated hard or light blows, as may be required. This special valve gear permits one man to easily

handle the hammer for drawing or regular forge work, or for die work. The change from one kind of blow to the other is made instantly and smoothly.

Fig. 1 illustrates the 100-pound post hammer of this construction and suitable for forgings not exceeding 2 inches

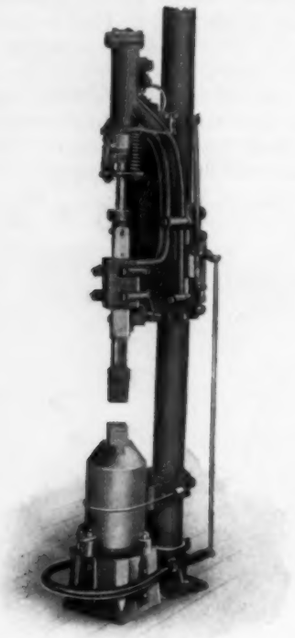


FIG. 1.— 100-POUND POST HAMMER.

square. The cylinder is 3 inches diameter by 10 inches stroke, the usual die face is 2½ x 5 inches and from center of die to face of post is 10¾ inches. Fig. 2 is the 250-pound post hammer for forgings not exceeding 3½ inches square. This ham-

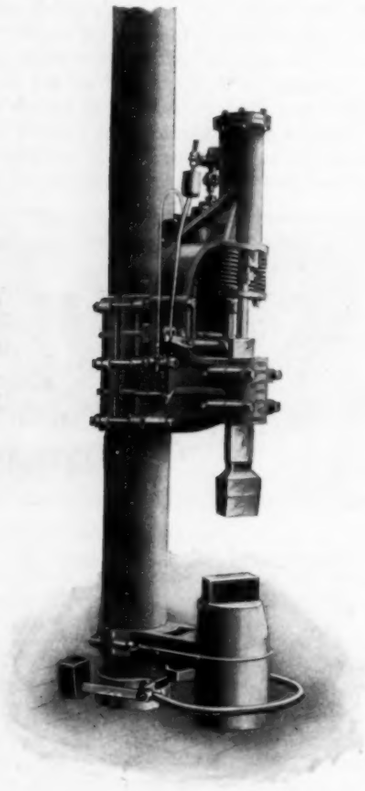


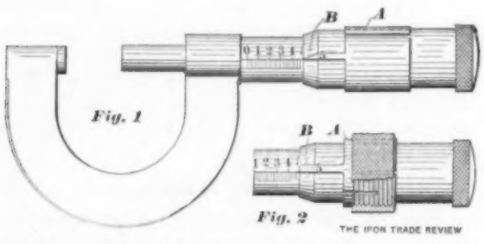
FIG. 2.—A 250-POUND POST HAMMER.

mer has cylinder 5 inches diameter by 18 inches stroke, the die face is usually 4½ x 7 inches and from center of die to face of post is 16 inches.

The cylinder and frame are cast in one piece from best quality, close grained gray iron. The exhaust ports are so arranged as to keep the cylinder always drained. The piston is forged solid with the piston rod from the best quality of O. H. steel. The ram is a steel forging square in form where it passes through the lower part of the frame, which acts as a guide. The lower end of the ram is arranged to receive the upper die in such a position that it stands at an angle of 45 degrees to the post supporting the hammer, thus enabling long pieces to be worked either way of the die without coming in contact with the post. The upper and lower dies are steel forgings and wedges so that they can be easily removed. The anvil is designed to be secured to a wooden block set on end, the anvil being bolted to the block with lag screws. The weight of the falling parts (the piston, piston rod, ram and die) designates the size of the hammer. The hammer is usually arranged for bolting to a wooden post. Special attachments can be furnished for bolting to a wrought steel column, or where preferred a steel column made of extra heavy wrought pipe will be furnished, together with the necessary clamps for properly clamping frame of the hammer.

Micrometer Improvement.

William D. Turner, of Providence, R. I., adapts a band for mounting on the graduated sleeve or thimble of the instrument and this band has an index to mark any given graduation to the exclusion of the rest. The band turns easily on the sleeve but has means for locking it in place when set. A micrometer equipped with the invention is illustrated in Fig. 1, and Fig. 2 shows only the sleeve and split ring in another form. A band A fits the graduated sleeve of the caliper and has an index B which on rotation of the ring may be brought to coincide with any of the graduation lines en-



TO FACILITATE THE READING OF THE MICROMETER.

graved on the sleeve. In this design, Fig. 1, the ring carrying the index is split along one side and has suitable diameter to clasp the sleeve of the caliper with a pressure due to the spring of the split ring. With the form of the invention shown in Fig. 2 the split ring may have its exterior tapered, threaded and provided with a nut for compressing the sleeve. The index B is here represented with a definite width as distinguished from the pointed form in Fig. 1.

The purpose of the index is to indicate to the workman the exact line on the graduated sleeve which must register with the zero line on the frame when the caliper is set for any given size. The inventor says: "This invention will be found of value when a workman is sizing a piece or a number of pieces, either by filing in a lathe or in a grinding machine by successive passages of the wheel over the work, the caliper being applied to the work from time to time to determine the required size. Suppose it is required that a piece shall be reduced by grinding to the exact diameter of five hundred and five thousandths of one inch. The index would in this case be adjusted to register with the graduated line on the sleeve marked "5" and the work reduced by successive applications of the grinding wheel until when the calipers closed upon the work the index is found to register with the zero line on the frame of the caliper. When duplicate parts are being manufactured, it is customary to allow a limited amount of variation to exist between the several pieces when finished. To return to the example given above, suppose a number of pieces are to be made approximately five hundred and five thousandths of one inch in diameter; but one-half thousandth variation above or below the exact size is allowable. In this case the index may have a width exactly equal to the space occupied by one of the divisions of the graduated sleeve, it being understood that this division corresponds to a difference of one-thousandth in the relative position of the measuring

screw of the caliper. Now when the ring is adjusted so that the index is over and central with the proper line on the sleeve it is only necessary that when the caliper is applied to the work the zero line in the frame shall be in line with any part of the width of the index to insure that the work is within the given limits of variation. A caliper provided with an index of definite width will be found of especial value when inspecting finished parts which must be within a given variation of size. It is not necessary that the exact reading of the caliper should be noted. It is only necessary to note whether the zero line on frame comes within the limits of the width of the index."

WIRE HOLDER FOR ELECTRIC LIGHT.

The two illustrations show a neat and convenient device for handling an incandescent lamp. The wire holder is called the "Electrogrip" and is a universal adjuster for suspended electric lights. The tension of the springs is sufficient to grip the lamp socket firmly to any part of a machine that the coils will straddle. By pressing the arms to the center, as in

FIG. 1.—THE ELECTROGRIP.

Fig. 1, the jaws will open and the object to be attached is placed between them; the springs do the rest. Fig. 2 shows the holder fastened temporarily to the toolpost of a lathe and the lamp adjusted to throw the light exactly where it is required by the workman. The light then follows the motion of the tool along the lathe as the carriage moves from end to end. The grip can be also employed for shortening the length of the suspension cord, and for this purpose the heavily insulated jaws prevent short circuiting at any defective place in the cable. The attachment does not interfere with the use of shade or guard and is readily applied to the lamp socket. The "Electrogrip" is manufactured by the Applied Device Co., of Springfield, Mass.

In the case of Alfred Stevens, of Newark, N. J., who sued the United States Steel Corporation because of its passing dividends on common stock, the corporation has filed a demurrer holding that Stevens does not show such a case as entitles him in a court of equity to any recovery from the defendant or to any relief against the matter complained of in the bill.

High Speed Steels*

BY WM. LODGE, CINCINNATI.

High speed steels have been, are now, and will be in the future, responsible for a great upward movement in the industry of machine making. The possibilities for machining metals, particularly so far as lathes are concerned, have been increased at least four-fold in the manipulation of wrought iron and steel and at least three-fold in the manipulation of castings. To take advantage, however, of the possibilities in the steels, it has become necessary, in order to make all the conditions right, to re-design not only the machines themselves, but to re-arrange the old methods of both holding the work and driving the work, new methods of mounting the tools and of holding them, as well as new methods of dressing and grinding. And while they may not apply so very seriously to small jobbing shops, it is perhaps the most important question that manufacturing institutions have to deal with.

There has never been a period in the history of the machine making industry that compares with the present in the matter of acceleration for the whole establishment, and this has been brought about by the advent of high speed steels. Manufacturing establishments that formerly got along reasonably well with the old methods of handling, storing, distributing

FIG. 2.—LAMP HOLDER IN USE ON LATHE.

and routing the work in process of construction, will find it necessary to make a complete change if they would have the various conditions connected with the industry keep pace with the rapid motion of the work through the factory. High class mechanical engineers are necessary in order to lay out suitable stock rooms to receive in their proper proportion all goods that come under the class of merchandise and that are bought ready to go into the machines; such as cap screws, set screws, nuts, bolts, washers, taper pins, name plates, index plates, etc. Other means will become necessary for storing castings, both of large and small caliber; also means of taking care of bar stock, covering all the different grades, such as square and flat cold rolled, square and flat rough stock, and all the other shapes and sizes mounted in such a manner that even boys, or men of light build, may readily handle bars weighing as much as a ton, from the rack into the machines and out again. The stock room man must be in evidence, the receiving clerk, the routing official, for routing the work through the establishment, the industrial railway delivering the goods from the yards under the cranes of the shops for rapid distribution to and from the various machines. Better arrangements must be made for distributing room for tools throughout the factories. In this respect an utter and entire

*Prepared for the sixth annual convention of the National Metal Trades Association at Philadelphia, March 24, 1904.

change will be necessary and a large amount of the red tape formerly used must be dispensed with and simpler and easier methods employed. Standard gauges and measuring instruments of all descriptions, and a system of manufacture making it possible for every piece to be made entirely without reference to the piece to which it is assembled.

Millions of dollars that have heretofore been wasted in the various features above described must now be given careful attention and these millions must be saved in order to place the United States in the foremost rank of manufacturing nations and keep her there. All our manufacturers will find it necessary to carry out a most vigorous campaign in their establishments, covering not only the conditions named, but also the still more important ones of equipping with up-to-date appliances and designs, especially with a view of using all the benefits conferred upon us by the advent of high speed steels.

Experiments with High-Speed Machines.

In testing some of the machines designed especially for high speed work, our company has expended thousands of dollars in order to determine just the kind of drive that must be applied where motor drives cannot be used and we have met with many and great surprises in conducting these various experiments.

Speaking of lathe work, the old-time thrust bearing with all the frictions which had been incorporated into the former designs, are found to be a great barrier to the use of high speeds, and new designs have become necessary for thrust bearings, for lathe centers and for means of applying the power so as to deliver the power to the cutting tool itself with the least expenditure in friction. In conducting these several experiments, a 30-h. p. motor with an ammeter attached, so that the power could easily be read by observing the finger of the ammeter, we have found by the mere matter of friction alone a diminution of more than one half of the horsepower. I mean by this that if sufficient speed is applied to the old style design of engine lathe to take advantage of the high speed steels, the friction engendered through the running of the cone pulley on the spindle, and the thrust bearings and centers, consumes an amount of power that almost at once makes the power plant inadequate to the calls made upon it, in attempting to take advantage of the possibilities that are in the steel. New and better designs were found to be necessary.

Then comes the necessity of testing out the value of the different steels offered, and while these have varied in the past year to a very large extent, the tool steel manufacturers are all working with the utmost care and intelligence, and our later experiments have shown a wonderful improvement in the uniformity and the staying qualities of steels of various makes. For reasons well understood it would not be either wise or fair to the different manufacturers, to make a public statement at this time as to which of the steels has been developed so as to give the very best results.

It soon became apparent while following this subject, that newer and better methods of chucking the work and of holding same to meet the strenuous conditions were necessary. The old-time bent tail dog must give way to something very much more substantial. The methods of obtaining diameters quickly and with the certainty formerly in vogue—which consisted in the lathe hand taking a light cut, trying his calipers, then another and another and another, until the desired diameter is obtained—must all be dispensed with, and ready means adopted for getting correct diameters, feeds, etc., by an unskilled workman. To a great extent the old time universal lathe that was good for all jobs must give way to the lathe made for its own particular work in manufacturing establishments. I do not mean by this that the regular ordinary type of lathe must be abandoned. It will always be a necessity. But possibly one-half of the lathes installed in the future will not be of that type, but will be designed more especially for a given class of work, with all the facilities for rapidly machining the work with the least possible consumption of both labor and power.

Time Reduced from an Hour to 2½ Minutes.

I have no doubt it will be a matter of great surprise to some of our members to hear that I have personally seen within two weeks, a lathe running 29 hours at 270 feet per minute, reducing bars of steel 3¼ inches in diameter to 3 inches, sufficiently true at one cut to be delivered to the grinding machine, and without regrinding the tool one single time during the entire period—a reduction in time of machining this piece from one hour under the old plan, down to 2½ minutes, besides having a better piece of work; feed one-fourth with one-fourth reduction.

This seems incredible and yet is perfectly easy to prove to anyone sufficiently interested to take the trouble to investigate. I have seen a tool stand up a solid hour on cast iron at 125 feet per minute and removing scale. It must not be imagined, however, that such results as these are obtainable from machines of the regular design. Not only must the machine be made to suit the new conditions, but the methods of holding the work, the methods of driving, the methods of holding the tools and of grinding, all of which carry along with them better methods of handling.

Under these new conditions the machine tool maker is very often put at a great disadvantage. When the possible buyer becomes acquainted with some of the facts mentioned above he immediately is willing to place an order, providing results are guaranteed, but is generally not satisfied that these results can be attained. Such results may be shown to him in the works of the tool maker, but finding when he gets the machine in use that the results do not follow in his own shop, he is too much inclined to lay the whole burden on the shoulders of the tool maker, who in any event makes only one profit when he sells the machine, while the man buying it makes an enormous profit each day.

I have a case in mind at the present moment where a certain equipment was delivered over a thousand miles from the shops of the manufacturer to the customer. The latter, having failed signally in making use of the machine, refused to pay for it, and put it up to the manufacturer to send some one this thousand miles and virtually change the conditions in the shop. The customer then refused to reimburse the manufacturer on the ground that the machines were sold to do this work and that it was the business of the maker of the machines to actually demonstrate their qualities to him in his own establishment. If this spirit is displayed very extensively it is going to stop the progress that is obtainable, from the sheer fact that the man who gets the advantage is not willing to shoulder any part of the burden.

It must be borne in mind when dealing with this subject, that a little difference in the hardness of the material upon which these high speed steels are engaged, makes a great difference in the number of feet per minute at which they may be run. Ordinary mild steel can be turned all day long at 180 feet per minute with a quarter inch feed and one-eighth reduction; in fact, I have seen this done on steel of .20 carbon—or at least the steel was sold for .20 carbon, but we made no analysis of it to prove that this was exactly correct. Again we recently saw some cast iron rolls which formerly had never less than two cuts, and frequently three cuts, turned from the rough casting at 150 feet per minute with ⅛ feed, ½ inch reduction, at one cut—nice enough to go to the grinding machine.

In the matter of deep drilling, lathe spindles of .50 carbon that formerly took five hours (and many of them are taking this amount of time today) are now finished in 30 minutes; the former speed of 40 r. p. m. being changed when boring a 1 9-16 hole to 400 r. p. m. and the feed from three-thousandths per revolution to six-thousandths per revolution.

Attitude of Workmen.

We also find quite a little opposition in installing high speed machines from the men who run them—referring to one shop only as an illustration. The man had expended from 7 in the morning until 8:30 without starting his machine, and when approached by the foreman to know why the machine was not running, he said he had to take some time to clean up. The foreman inquiring if 15 minutes was not sufficient to wipe off the machine was answered, "I am tired and have to rest." This lost him his place. The second man lost his place because he consumed more time in putting the work in and out than he did in the actual doing of it. These are matters, however, that will be adjusted in the hands of efficient managers.

It must be remembered that much more space around each

machine is required, both for the stock in the rough and for the finished stock. I have found this from our own experience and point it out, so that some one else may save a rearrangement of the machine with all that it involves in the matter of adjusting pulleys on the line shaft, countershafts, shifters, etc.

What I have said is barely a synopsis of what may be said on the subject; but I trust it is sufficient to set all of you to thinking and I want to assure you that there is no intention on my part to secure any personal advantage, but merely to direct the attention of the members of the National Metal Trades Association, or at least those of them who are not aware of it, to what is going on. It is better to be in advance than to have other nations force us through their superior knowledge of this subject, to follow them.

The period is not far distant when we shall find the markets of the world a necessity, as the rapid growth of our industry in our own country has already brought our production to a point where it is likely to be greater than the consumption. In order to compete for the markets of the world—especially in view of the labor conditions we have to contend with—it behooves all of us to be on the alert and to see to it that no stone is left unturned that will assist us in our endeavors to become the foremost industrial nation and to make our product so well known the world over that the mere statement that an article is made in America will be sufficient for the buyer to take it for granted that it is as represented in every particular, so that the mere offering of it should mean its sale.

United Engineering Society.

The United Engineering Society is the name of the new organization which will hold and manage the building to be erected with the $1,500,000 presented by Andrew Carnegie, and to be headquarters in New York for the American Institute of Electrical Engineers, the American Institute of Mining Engineers and the American Society of Mechanical Engineers. A bill introduced in the Assembly of New York, March 31, provides for the incorporation of the society. The incorporators are: Charles F. Scott, Albert R. Ledoux, Theodore Dwight, Charles Kirchhoff, Charles Wallace Hunt, Frederick R. Hutton, Schuyler Skaats-Wheeler, Bion J. Arnold and James M. Dodge.

Henry L. Coe has commenced proceedings for the appointment of a receiver for the Leckrone Coke Co., of Leckrone, Pa., at Uniontown, Pa. Mr. Coe was president of the company and its general manager until deposed several days ago. He says that John R. Carothers, secretary and treasurer of the company, who has succeeded him, has interfered with his duties since the first of the year and refused to pay his salary since that date, with a view of having him sacrifice his stock. The company is capitalized at $25,000 and during the first six months of operations realized a profit of $17,000.

The Southern Supply and Machinery Dealers' Association holds its next convention at Old Point Comfort, Va., April 12-14. Among the questions to be discussed is this: "Is it not to the interest of the manufacturers as well as the dealers for the manufacturers to establish minimum selling prices, and should not dealers who maintain such prices be compensated by some rebates?"

Chas. G. Smith Co., direct representative in Pittsburg of the Bullard Machine Tool Co., Becker-Brainard Milling Machine Co., P. Blaisdell & Co., Whitcomb Mfg. Co., Safety Emery Wheel Co., Eastern Machinery Co., Mueller Machine Tool Co. and Bath Grinder Co., announces the removal of its offices from 347 Fifth avenue to the Park building.

Walter Kennedy, mechanical engineer, of Pittsburg, has removed from 611 Penn avenue to the new Bessemer building, at the corner of Sixth street and Duquesne way.

The Keystone furnace of the Reading Iron Co., Reading, Pa., resumed operations March 30, after six months of idleness.

The Employers' Association of the Future.*

BY HENRY M. LELAND.

The most important question before this convention, and the employers in the manufacturing industries of our country today, is that of organization. However, before discussing these various associations, allow me to define my views on the labor unions, because I wish to speak plainly on this point and do not wish to be misunderstood.

I have no bill of complaint to file against organized labor as an institution. I do not propose to criticise unions as organizations in so far as they help to make better workmen, to secure better conditions for themselves or for society. Employes have a perfect right to organize; they have a right to refuse to work under any conditions that are objectionable to them; and for none of these things alone should they be censured by any broad-minded man. They should be accorded fair play. They should receive at all times the full measure of justice, equity and fair dealing. I have no sympathy or apology for the employer who is unfair to his help in the matter of hours, wages, or any other details affecting their rights as between man and man, and there are, I regret to say, such employers.

For more than one hundred years the wage-earners of this and the older countries have been organizing for what they have called the protection and achievement of their rights. In all ages the human mind has ever sought to either lighten or eliminate manual labor, man's zeal and energy in this line being always dependent largely upon his environment. Even the story written by the discovered relics of prehistoric ages tells us of this striving and groping towards this end. The marvelous development of labor-saving devices of the past half century, which has been the potent cause of the advancement toward higher and better surroundings for mankind, confirms this fact, and demonstrates how man, ever watchful and alert to better his condition, has kept full pace with the advancement in tools and inventions which he has acquired and appropriated to his own use and to supply his more advanced wants. Keeping fully apace with the tools and devices man has made to lighten labor and supply his needs has been the progress and development of man himself. "The man who formerly scratched the earth with a bent stick or a grub hoe was surely an inferior organism to the man who rides and drives his sulky plow." And like comparisons might be made in all the occupations of life.

Growing out of the mighty evolution of the world's industrial system, in the midst of which we find ourselves today, with all its complex mechanisms, have come the tools or methods of the wage earner to better his condition, as he is engaged in his daily work, operating these labor-saving devices which are giving the universe such a tremendous uplift. The device which the wage-earner considers his most potent and efficient tool is the union, or co-operative labor organization. And thus in the same way that machinery and the many contrivances developed by man have multiplied in a continually accelerated ratio as the years have passed, so the multiplicity of the labor organizations has kept in step right alongside of the progress in improved machinery. However we may regard the problems that have grown out of this wonderful industrial movement of which we are a part, whether we approve or disapprove, it will no difference. The movement is here; it is an invincible force; we must deal with it whether we will or no—we must as manufacturers recognize not only that it is here, but that it claims our serious and most vigilant attention.

The labor organizer has been a numerous quantity with us the last few years. He has not only organized the male wage-earners in every productive employment, but has gathered in the servant girls and the female wage-earners in nearly every craft. I quote from a late magazine:

"The women turned out in force in Chicago last Labor Day; the women garment-workers with the bricklayers; the sausage girls with the bell boys; the lady crackerpackers with the beer-bottlers; the public school teachers with the coal teamsters; and thus the petticoated trades-unionists of Chicago

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turned out 35,000 strong to mingle with their brother unionists in all the democracy of the labor movement."

The professional organizers are moving toward capturing the police and the firemen, and, I am told, are already successful in some places. Just imagine what will be the outlook for the man who runs a so-called "scab" shop when there is a riot at his plant, and the police force are all good union men! Or what about a fire in such a plant, where the loss of five minutes of time might mean the loss of thousands, perhaps millions, of dollars?

We sincerely regret the fact that as our friend the wage-earner has progressed with his organizations, he has grown more aggressive, more arrogant. He has not only told you just what, and only what, machines you might be permitted to operate in your plant, and how many hours you should operate them, and whom you may employ to operate them, whom you may employ to act as your foreman, etc., etc.; but he has finally gone to such lengths in his lofty arrogance, and has so securely entrenched himself in the community, that he has with impunity placed his army of pickets around your house of mourning, to make sure that no "scab" shall carry forth your dead to their last resting place, and to assure himself, forsooth, that the man who drives the hearse wears a union button. Otherwise riot, bloodshed and anarchy meet you at your front door as you go forth to perform the last rites peaceably over your dead. What more can he do? How long will our civilization tolerate such barbarism?

How slow have we been to foresee where these encroachments upon the sacred rights of humanity would lead, and how tardy have we been to take effective measures to protect ourselves and our homes from the professional agitator, who captures a few—often less than 10 percent—of the most worthless and dangerous of the members of the labor unions, and then, because of the effective organization which he controls, secures the support of the great army of wage-earners, who have no real sympathy with the unreasonable and often absurd demands which they attempt to put in practice. The majority of the union has been coerced by a blatant and unscrupulous minority, and the employers often find themselves, for want of proper and effective organization adequate to cope with the particular phase of the complicated conditions, deprived of the very rights of American citizenship.

Singlehanded, as individuals, firms, or corporations, the manufacturers are powerless against these great combines of organized labor, whenever they determine to do them harm, even though it be without right or reason. If the manufacturers of this country were effectively organized as employers, the principles of their organization laid on a firm foundation of justice, equity and fair dealing, with no intent or attempt to destroy or crush, with a noble purpose to help their employes to attain larger opportunities, better homes, better education, better environment—they could accomplish all these things, and at the same time protect themselves against the assaults of prejudice and against the grotesque demands which are now frequently forced upon them by the strike and the boycott.

The local associations which have multiplied recently have been of great service and have done most effective work within their own limits, which are of necessity quite circumscribed. And there have also sprung up a large number of other employers' associations, covering different and larger fields, some of which are national in their scope, until we have some half dozen or more national employers' associations attempting to protect and administer the interests of their members, who are spread all over the country. The distinct lines which should separate these associations the one from the other have not yet been drawn, and the exact status of each has not as yet been clearly defined.

The writer was recently in Washington, in the interest of the opposition to the Eight-Hour and Anti-Injunction bills, and found many representatives there from all sections of the land. He was more than surprised at the number of these associations which had sent their representatives to protest against the vicious and dangerous legislation. The number of associations springing up on every hand suggests the necessity of at once devising some plan for an organization which shall be able to draw to itself all the strength of these now, for the most part, isolated and dissimilar organizations. The local associations are often vastly different in the trades they represent, according to the localities and judgment of the members; and these dissimilar interests make much confusion in regard to methods, policies, dues, representation in national bodies, adjustment of labor troubles, etc., etc.

The present associations of all kinds are more the result of the most pressing need for some immediate protection against organized oppression, than the result of careful study of all the problems involved, and of well-matured plans to meet all the conditions on both sides of the controversy, or to secure the best results by the least objectionable methods. It must be apparent to any thoughtful person that we have not in existence yet an organization which is capable of adaptation to all the diversified and complex interests of the manufacturing employers of the whole country, and affords them the protection which, under present conditions, is indispensable. The organizations now in the field, both local and national, are, because of the dissimilarity of the trades and interests, and the scope of the different organizations, as ineffective to meet our present momentous and imperative needs as a national army of a million men would be if divided into battalions of three or four hundred men, each independent and working in its own way, instead of all being under the command of one head, and the entire army cooperating and available to be concentrated upon any one stronghold of the enemy. In other words, the multiplied associations which overlap each other on one side, and leave exposed and dangerous vulnerable points on the other, are neither natural, logical, safe, nor permanent. This is no reflection upon any one. It is simply a product of the peculiar conditions which brought these associations into being. Realizing these facts, we should surely seek for some more effective and less objectionable method.

In my judgment the natural ultimate form which these associations shall finally assume—that is, the associations which are to meet all the needs of the employer of the near future—should be an organization broad enough in its scope to absorb in its membership every manufacturing employer of labor whose employes can by any means be organized into a trades union or similar organization. Each one of the different trades or crafts should have its own local organization in each town or city or sufficient size. Towns not large enough to have their own local associations should unite with other contiguous towns, and have their district associations, all these to be represented by delegates, which will thus form a State and a national association, such as an employers' association of machinists, of boilermakers, foundrymen, masons, carpenters, etc., etc.—each of these associations to have its local organization and its State and national association, composed of delegates from subordinate bodies. The head and seat of power in regard to laws, ways and means, etc., should be the Federated Employers' Association, composed of delegates from each of the different national associations of the different trades; this supreme national association, thus constituted, to be to the manufacturing employers of the country practically the same as the present Federation of Labor is to all the organized labor bodies of the country.

You will appreciate that I do not for a moment attempt to solve the details or lay out the routine of work for these organizations. The most I hope for this paper is that it may suggest, perhaps, what may lead to an effective and adequate organization, and the suggestions are merely tentative. It seems to the writer that our local, State and national government suggests a plan which could be developed, and possibly adapted to meet most, if not all, the needed conditions of such an organization as we are considering.

Again, the labor organizations—this may not be a compliment to us—have certainly given us a potent object lesson in organization. They are surely well organized, and the locals in each trade have the facilities for local protection, and these all have representatives in each of the larger organizations, including the Federation of Labor, the supreme authority for all the organized men in whatever craft they may happen to be employed.

It is with some hesitation that I have suggested that such an organization of employers as is rudely and imperfectly indicated above be established; hence may I be allowed a word of caution. An organization of such gigantic resources and

power as this supreme body would have, must suggest a danger to every thoughtful man, for the reason that it would have almost unlimited power for good or for ill in its hands. It would not only control tremendous capital and influence, but would have within it the broad experience and trained wisdom of the combined manufacturing interests of this country. One cannot contemplate with complacency the possibility that such power might perhaps get into the control of selfish and unscrupulous men, for we regret that capital has been at times proud, arrogant and insolent. With such men in control, most serious and lasting injury might be the result, and the very interests we are attempting to protect be seriously jeopardized or even destroyed.

However, I am fully satisfied that the organization will be a safe one if it shall be broad in its scope, taking into its fold the diversified manufacturing interests of all parts and sections of our land. Can we not confidently believe that the very broadness of the scope of the work, and the many sections of country represented, and the great problems involved, will make certain beyond a doubt that there will always be a sufficient number of strong, honest, farseeing, prudent men in the organization, who can be depended upon to prevent the organization from unwise, unsafe or unjust legislation or practice? Such an organization would be a most potent symbol of authority, because breadth, integrity and fair-dealing shall be emblazoned upon its banners. It would compel the respect of all men, because it would have the character and power not only to render just and equitable decisions, but to enforce these decisions when they have been fully considered and enunciated by the properly authorized executive authority. When we shall have such a national organization of employers, will not this very fact of itself be a mighty force to make employers wiser, more generous, and the wage-earner a more cautious, thoughtful and better man? And thus, perhaps, we shall have achieved that which has been said to be "the loftiest ambition which ever entered the mind of man, that of creating a new and better civilization."

When we have progressed thus far, then, indeed, the time will have come when we can hope so to teach, instruct, and lead the wage-earner that he will not see simply his wrongs; when he can stop shouting for a moment about labor's rights, and reflect upon labor's duties; about the obligation to do a fair day's work for a fair day's pay; about helping the employer to cheapen his product, and thus bless the community, instead of striving to restrict the output, making higher prices and smaller markets. And under this wise and prudent leadership the employer will also think less about his rights, and consider, as the workman has done, more about his duties to his employes and to the community. He will then realize that there are other things that are more important and lasting than dividends; and out of this change of heart of both capital and labor will come a greater peace and prosperity.

When these things have been accomplished, the association may well take up the question of education. There is today a widespread misconception, or misunderstanding, not to use a stronger term, in regard to the entire question between the employer and the employe. The prevalent and false ideas in regard to the real conditions are not confined to any one class. The fallacious notions are prevalent among the wage-earners, the employers, the rich and the poor, the practical man and the doctrinaire. Each class has an abundance of misinformation on these vital questions. One of the most important works which can be done by such an organization as this paper is suggesting, is to eliminate these sophistries from the entire community, and replace them as far as possible with the truth, and with reasonable theories and correct principles which can be lived up to in practical every-day life in the first quarter of the twentieth century.

But this education, if we really desire to see it spread and be absorbed with a keen relish, must come to the people, not as an education, but rather as information. And this information should be so wrapped up and delivered in such attractive parcels, that the people shall earnestly seek for it, and by seeking they should be sure to find the real facts and actual conditions.

This supreme national association of employers can, and I believe will, establish a great bureau of education, which will be in control of the broadest of our great educators—men whose whole life training shall have qualified them abundantly for this great work. They should then be equipped with all that is required in machinery, money and men, to carry on such a system of education as will meet all these conditions, and be fully up to twentieth century methods, serving every one according to his needs, both the wage-earners, the great middle classes, the more wealthy and cultured classes, the laborer and employer alike. Each and all should have an abundance of information which is accurate and true, which is free from prejudice, and from one-sidedness, and which will thus establish a universal sentiment of right, equity, and fair dealing.

May I cite one or two instances, simply to illustrate what I mean by the mass of current misinformation which can only be counteracted by a systematic and thorough scheme for disseminating the actual information in regard to all these questions. First, the prejudice against improved tools and machinery. I quote on this point from one of their own labor leaders in England, who has had his eyes partly opened. Frank H. Rose says in the March number of the *Engineering Magazine:*

"To the uneducated operative of the early part of last century the machine was a malignant and insatiable monster, which had already devoured his brother, and would devour him in turn. He had none of the evidences before him of the benefits which have come to the world as the result of machine processes. The machine was apparently a device of his immemorial enemy to starve him and to slay his calling. He acted upon the first impetuous impulse of ignorance and hatred, and took the impotent course of trying to wipe out his foe by violence.

"In front of the workman today are all the vivid proofs of the uselessness, as well as the mischief, of resistance to the inevitable. However unpopular may be such a declaration, I know that no honest inquiry into this subject is possible which does not take cognizance of the prejudice which still exists in the workman's mind against new appliances for increasing labor's productivity. Whatever may have been the outward manifestations of this prejudice, the results have been uniformly mischievous, and consistently productive of strife and waste. Yet the growth and development of the machine system is as certain and remorseless as death. No attempt to resist it has ever been crowned with even a temporary success."

Those who have carefully investigated the question of labor-saving machinery, have been convinced that it has been by far the greatest factor in civilizing and uplifting mankind, including the laboring man; that it has not only given him much better wages, but that it has multiplied the demand for labor, and has also materially increased the purchasing power of every dollar he earns. Here is a most fertile field for education, and it would be of incalculable advantage if this prejudice against improved machinery could be eliminated, and the wage-earner's help and co-operation secured. And this is surely worth our effort, for "to achieve the smallest practical good is better than any magnificent effort to realize an impossibility."

Another thing which should be taken up is the bitter denunciation bestowed upon certain events about which the general public are entirely in error. Allow me to cite only one instance, namely, the real issue at the Homestead strike. I recently heard an alderman, in a speech brilliant with pyrotechnics and the most blood-curdling denunciation of Carnegie and what he called his "blood money" and all who had any sympathy for him, ring in all the changes on the "starvation wages at Homestead" with all the regular menu of the demagogue when he is playing to the gallery just before election, and when he feels the labor vote is indispensable to his re-election. Contrast these things, which are of daily occurrence in the press and on the forum all over our entire land, with the following candid and truthful statement made by Rev. Wilbur F. Crafts, who has ever been one of labor's best friends and most constant advocates. He says:

"The main contention between labor and capital was most exactly presented in the strike of 1892 at Homestead, four miles from my Pittsburg home at that time. The world's most famous if not most wealthy manufacturer proposed a slight reduction in the wages of his best paid mechanics, the best paid in the world. They struck, not, as too hasty

preachers, politicians and agitators declared, in resistance to "starvation wages" but in defense of the claim that labor already received less than its just share of the joint product of capital and labor, and, as a matter of principle, should not submit to further reductions. These workmen were in no more danger of being pauperized than our Revolutionary fathers would have been if they had paid the small tax on tea. The contest in each case was for rights, not for bread. The reduction affected only three hundred and twenty men, of whom the highest grade were receiving $271.00 per month —which was cut down to $230.00, being at the rate of $2,760.00 per year, after the cut—while the lowest grade were to receive $45 per month after the reduction, which is more than some ministerial salaries. The strike on the part of the other workmen was a "sympathetic strike." All agreed that even the thousand-a-year workmen must not be cut down to swell their master's million a year."

And yet there are thousands of manufacturers in this country, and millions of honest, well-meaning people, who are not informed as to the real facts in this case. Hence there is surely a great opportunity for education and correct information to be scattered where much good will be accomplished.

One other thing that our education bureau can set right: The feeling is almost universal that employers are opposed to labor organizations as such, and that they claim the laborer has no right to organize trades unions. The newspapers are replete with arguments, the editorials bristle with brilliant statements, that the workman has a right to organize, and to quit work, etc., etc. The orators, the agitators, and the general disturbers of the peace are constantly asserting that the laboring man has a right to organize; and one would think, from what we hear and read in the papers, that the right to organize unions was the principal issue in nearly all strikes. Will you pardon a personal allusion. I have sat on many arbitration boards, discussing questions between the employer and the wage-earner and have been present at many trade disputes; but I have never yet heard one single employer of labor deny the absolute right of labor to organize as many unions as they please, to quit work, and all such rights. I have never read a decision on one of these questions from a judge, in which he did not emphasize this right of labor to organize—a right which must be the heritage of all free citizens in any country standing for personal liberty. The employer does not deny them any of these rights. When they use their organization to coerce, to intimidate, and to brutally assault other men who want to work where they do not, this is the place where we take issue with them. Judge Beck made this point very clear in his recent argument before the Judiciary Committee of the House of Representatives. He says:

"I venture to say that there has never been a case in the Federal courts—and if my friends on my right can disprove it, let them disprove it when their time comes, and to that extent anything that I shall have said shall be robbed of any force it might otherwise have by being proved to have been incorrect in statement—I say, let them cite a single case in which a court ever enjoined them from either striking, or, if a labor organization, from combining for the purpose of elevating and raising their condition or increasing their wages, or any other peaceable and lawful purpose whatever. The dead line has always been drawn where moral suasion ends and violence begins. You can take the cases of Judge Rogers and Judge Jackson, the most extreme injunctions, and they were in each case based upon acts of violence."

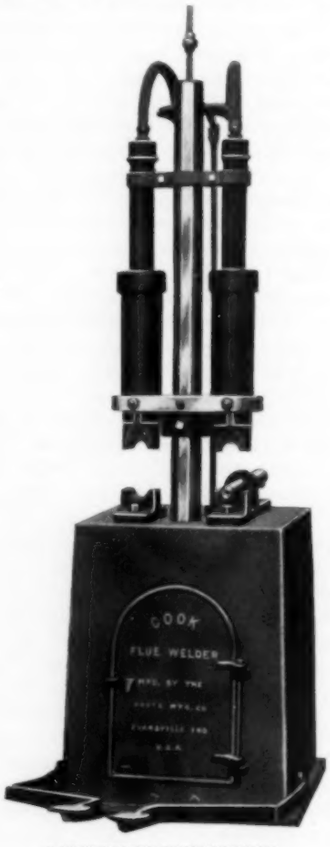
Of course, you will understand that an unlimited number of similar topics which will be to the advantage of the community to have correctly exploited, and which are now either superficially or wrongfully understood, can and will doubtless be taken up by such an educational system as this paper contemplates. But time will not permit further illustrations.

In closing, I desire to plead for a broader consideration of these questions, and that this association shall do all in its power to raise the discussion of these industrial and labor problems to a higher plane, and that all the work of the organization will be exalted above the mere question of selfishness, greed and dividends. Cannot such an organization take measures tending to lift this whole question out of politics and the domain of class bitterness, by instituting far-reaching educational schemes, and thus enable the advocates of all sides of the question to approach it in a spirit of fairness, recognizing all the rights of citizenship for both, whether they toil with hand or brain? And may we carry on this work as Epictetus taught, when he said: "Live with thy inferiors as thou wouldst have thy superiors live with thee;" and as our own Lowell has said: "Be noble, and the nobleness that lies in other men, sleeping, but never dead, will rise in majesty to meet thine own."

I feel that the discussion of this question is profitable, but I do not feel that a question of such great importance and far-reaching consequences should be decided by this convention; but that this whole question pertaining to employers' organizations should be referred to a committee of five or seven men, or to the incoming council, with instructions to give the matter the most careful and thorough investigation, and report to a future convention. This is a much broader and larger question than any particular organization. What we all want is the most effective system of organizations that the combined experience, wisdom and foresight of all our leaders and membership can suggest. When we have such plans, once accepted and endorsed, the organizations will grow up around them naturally, expeditiously and permanently. In all our work I trust that we will follow the counsel of the wise philosopher Kent, who said: "So act that your principles of action would bear to be made a law for the whole world."

PNEUMATIC FLUE WELDER.

The pneumatic flue welder made by the Grote Mfg. Co., of Evansville, Ind., is illustrated below. There are two cylinders, one for swedging and the other for welding, and these are suspended from the column and readily adjusted to suit any size of flue. Pneumatic machines of this type are provided with a common form of valve, but this is discarded in the present



A PNEUMATIC FLUE WELDER.

device and the working of the apparatus is spring controlled, a feature which is now the subject of a patent application. The tool is compactly and substantially built for the hard usage a machine of this kind is expected to receive in everyday service. The mechanism for controlling the compressed air supply and the general design of the flue welder render it very sensitive and easily handled.

METRIC SYSTEM WOULD COST A BILLION DOLLARS.

The statements brought out in the argument made by Henry R. Towne, president of the Yale & Towne Mfg. Co., before the House Committee on Coinage, Weights and Measures, at Washington, are of more than ordinary weight in view of Mr. Towne's long experience in the fields of manufacture and engineering. Mr. Towne's statement in large part is given below, together with the comments and questions of Congressman Gaines, of the House Committee:

Mr. Towne—The argument is made that we need this change in order to foster our export trade. This trade is already vast and increasing, is of vital importance to the country and, above all, to our manufacturing industries. We are today undoubtedly the greatest manufacturing country. Our mechanical industries—of course, I do not speak of agriculture, the greatest industry of all and the foundation of all our mechanical industries—are based primarily, every one of them, on the machine tool industry. Every element of those industries is built up on the English inch as its cornerstone, and if you pull out that cornerstone the edifice will fall.

Mr. Gaines—Let me ask you a question there. We have sold millions of our machines in foreign countries. That machinery will have to be repaired from time to time, when it wears out or breaks, or new machinery is supplied from this country. If we should change to the metric system here, and hereafter make our machinery on the metric system, would it interfere with the supplying of those parts in those foreign countries?

Mr. Towne—Yes, sir. These implements, these machines, would become depreciated in value in this, that they could be repaired only by parts made to the English standard, which latter could not be used with machine tools made under the metric system.

Mr. Gaines—How much would it cost you to change your machinery from your present system, the American system, to the metric system? And when you answer that tell me, if you possibly can make the calculation, how much it would cost the manufacturers of the United States, all the manufacturers, to change their machinery from the present system to the metric system?

Mr. Towne—I will state, to cover all your question implies, that in case of the complete substitution of the metric system for the English system of weights and measures for all of our manufacturers, a thousand millions of dollars would not pay for it.

Mr. Gaines—Would it practically bankrupt the capital invested in machinery now?

Mr. Towne—No, sir; because the American manufacturer would not acquiesce in the change. The impression prevails that this change would be accomplished to a large extent by the withdrawal of the carpenter's two-foot rule and the substitution therefor of the metric rule. I want to illustrate by these exhibits the fact that, in practical metal working, we do not use the two-foot rule. We work with gauges and sizing tools. I want briefly to illustrate what these gauges represent. Here is a file of blue prints showing on each page from two or six gauges—nothing but gauges, all relating to a single product in the Yale & Towne Mfg. Co.'s works. That product is a common dial or combination lock used on safes. It is only a trifling part of our total product, and this is the gauge equipment required for that one product.

Mr. Gaines—How much would it cost to reproduce that if you had to change it to the metric system?

Mr. Towne—Not less than $5,000 or $6,000 for this set of gauges; probably $10,000. That product is just a small part of our total business. Every dimension, on every one of these many sheets, is in decimals of an inch; always in hundredths, more often in thousandths, sometimes in ten-thousandths. For example, here is a gauge used in making one part of a Yale lock of a certain size, a small size. This is the article. Here is the gauge by which the workman ascertains whether the diameter of that piece is right or wrong. The proper diameter is 40-100 of an inch. This gauge is made of hardened steel, ground accurately, and this hole is exactly 40-100 of an inch in diameter and the piece should go into it snugly. This other hole is 1-1000 inch smaller. The article must not go into the latter gauge. If it does it is rejected. The limit of error, or tolerance, as it is called, in this particular article is 1-1000 of an inch. We do our work with gauges of this kind, not with a two-foot-rule, and not even with a steel rule. To produce such a gauge as this we use a scale graduated down to the ten-thousandth part of an inch; but we have others which give the one-hundred-thousandth part of an inch.

The daily use of these gauges involves a little wear. That wear has to be corrected from time to time and finally the gauge has to be thrown away and replaced by a new one. In order to ascertain how much wear is taking place we must have a set of "master gauges" which are kept locked up and never used except for reference—perhaps once a year, once a month or once a week. These working gauges are carried to the room where the latter are kept and tested by the reference gauges to see if they are worn so much as to be condemned. If they are, they are replaced by others. A working gauge nearly always has to be duplicated by a reference gauge.

Mr. Lanning—Can you tell us—perhaps any of us could figure it out, and possibly some have already done so—how would 800-1000 of an inch be expressed in its metric equivalent, and how would 799-1000 of an inch be expressed?

Mr. Towne—The equivalent of a millimeter is .0393707904 inch. Now, to convert these existing articles, all of which are dimensioned to the English inch, into dimensions of the metric system, of course, you must go into millimeters. You cannot use the meter for such a minute measurement. You have got to multiply each one of your fractional parts of an inch by this string of ten decimals, which is the arithmetical equivalent of the millimeter to the English inch.

In order to produce repetition work economically, where it involves other mechanical operations, the workman is furnished with tools of which there are many kinds, and of which the jig is a typical one. The workman puts the jig, containing the work, under a drill press. The jig has two hardened steel bushings on this end, and a drill is driven through these holes so that all that the workman has to do is to see that the drill goes into these bushings, whereupon the holes are located in the right places. The piece of work on which this jig is used is based upon drawings dimensioned in the English inch and its decimals, next upon gauges, also based upon the same measurements and then upon the jig.

Finally, in many cases where great accuracy is required, as in the case of repetition work, it is tested by a gauge. Every one of these pieces, after it is made in machines of this kind, is put into this test gauge by a workman or inspector, who then holds it up to the light to see that it touches at the testing points, and if it does not it is rejected as imperfect. It is this vast equipment of gauges and tools of the most expensive and elaborate character which forms the foundation of American mechanical industries, that enables us to make that product with the economy that we do, and thereby we are enabled to sell it in the markets of the world. This equipment would not be obliterated; we have got to keep it for a hundred years yet in order to make repairs to existing machines. But all of it would have to be duplicated with another equipment, of identical character, changed minutely in dimensions in order to bring it to metric units, if we change to the metric system of measures of length.

Mr. Candler—Do you know of any demand on the part of people engaged in practical business in this country who are asking or demanding this change?

Mr. Towne—Not one. Why should they ask for it? It is open to them today to use the metric system. What I hope your committee may decide to do is to introduce a bill for the creation of a national commission on standard measures of length, weight and volume. The commission so appointed should be authorized to make a report as to what, in the light of all the evidence it can collect, is the most expedient thing to be done with our national standards.

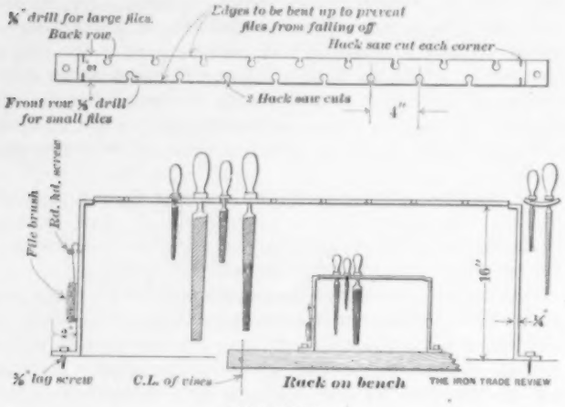
Mr. Gaines—Why should we do anything if everybody is satisfied?

Mr. Towne—There are some of our measures which could be improved. I think our three measures of weight could be unified into one, with little disturbance. I think our measures of volume could be united into one, and harmonized with the English system. Measures of weight and of volume relate practically to the present and the future. They have little to do with the past. But measures of length, in the language of one of the persons who has written on this subject, "are linked irrevocably to the past." You cannot obliterate them. You may compel manufacturers to submit to confusion, where we now have uniformity, and to incur an enormous expense in duplicating their standards of length; but you cannot obliterate the existing system.

AN INEXPENSIVE FILE RACK.

BY HARRY ASH.

In these days of modern practice it looks very medieval to see files strewn all over a bench or a bench hand "pawing" through a heap of files in a drawer, not to say anything about the file teeth being broken from coming in contact with other files, etc. With the above in view I designed a file rack which proved so inexpensive and practical that I equipped every bench hand in the shop (there being some 40 or 50) with racks. It is needless to say the saving in files and time and



FILE RACK.

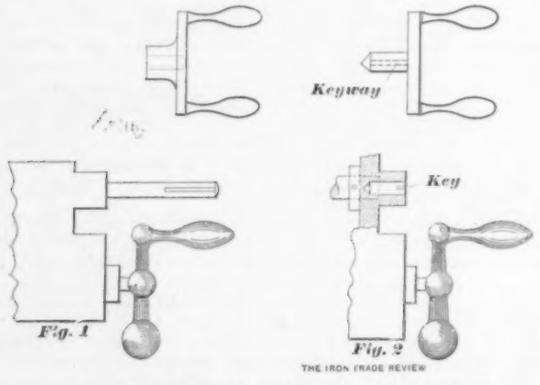
the liking the men took to the change made the move one which I never had cause to regret. The sketch will be found very plain. The laying off of holes and sawing of slots was done by the tool room boy, which in a measure accounts for the slight cost of the racks. The drilling was done by a boy also. The files at the rear are easily removed and replaced, as no file in the front row interferes with the back.

A POINT IN LATHE DESIGN.

BY ROBT. A. LACHMANN.

It is evident our builders of lathes are adding many valuable features to their product, but there are still a few things to be desired. One of these is the elimination of the annoying stem for the compound rest handle.

Feeling somewhat disappointed at finding one of the most modern lathes on the market (recently installed in the plant with which I am familiar), still arranged in the same old way,



A SUGGESTION FOR THE MACHINE TOOL DESIGNER.

I thought it about time to say something and therefore am sending you a sketch showing the contrast between the old arrangement and that which I deem a much needed improvement. The old way is shown in Fig. 1 and the new plan in Fig. 2. The sketch is self-explanatory and I will only say it is merely a case of reversing matters and putting the annoying stem on the removable handle where it cannot come in frequent contact with the operator's knuckles. I trust this suggestion may be the means of adding to the many good features of our modern lathes.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Excelsior Mfg. & Supply Co., St. Louis, Mo., has been incorporated with a capital of $150,000 to manufacture and deal in tools, machines, etc. The incorporators are: Henry A. Magill, Charles G. Woods and Gilead P. Cheney.

The Jones & Hopkins Mfg. Co., Nashville, Tenn., has been incorporated with $50,000 capital for the purpose of enlarging the business of Jones & Hopkins, dealers in stoves, manufacturers of sheet metal, tin and cornice work. The officers are: President, John A. Jones; vice president, I. L. Pendleton; secretary and treasurer, A. M. Hopkins.

The Ready Machine Screw Co., Reading, Pa., has been incorporated with a capital of $200,000 to manufacture and deal in screws.

The Missouri Mine Locomotive Works, Kansas City, Mo., have been incorporated with a capital stock of $50,000 to manufacture mining machinery. The stock is owned by A. H. Korsmeyer, R. H. Matthew and D. A. Murphy.

The West Virginia Car Fender Mfg. Co., Sistersville, W. Va., has been incorporated to manufacture street car fenders; capital, $25,000.

The Bison Motor Co., Buffalo, N. Y., has been incorporated with a capital of $25,000, to manufacture motor vehicles.

The National Tool Co., Chicago, has been incorporated with a capital of $10,000 to manufacture tools and machinery. The incorporators are: Clarence A. Moore, R. A. Allen, A. E. Park.

The Barrett Typewriter Co. has been organized at Grand Rapids, Mich., with a capital of $300,000. The stockholders are: Glenn Barrett, Daniel W. Tower, George F. Sinclair and Wesley Hyde.

The Mercantile Bridge Co., Charleroi, Pa., has been incorporated with a capital of $5,000.

The Donaghy Owens Foundry & Machine Co., Pittsburg, Pa., has been incorporated with a capital of $10,000.

The Latchford Machine Co., Chicago, has been incorporated with a capital of $50,000. The incorporators are: Joseph M. Griffin, Warren Nichols, Harry A. Warren.

The Conoidal Union Valve Co., New York City, has been incorporated with a capital of $200,000. The directors are: W. M. Barr, W. M. Palmer and C. T. Willard, of New York City.

The Grinding Machinery Co., Chicago, has been incorporated with a capital of $5,000 to manufacture grinding machinery. The incorporators are: Robert Tarrant Jr., Clyde W. Blakeslee and Charles C. Carnahan.

The Randall Motor Co., Ft. Wayne, Ind., has been incorporated with a capital of $10,000. The incorporators are: Tay P. Randall, A. L. Randall, Lonn Ohnhaus.

The Sandusky Foundry & Machine Co., Sandusky, O., has been incorporated with a capital of $50,000 by Sidney Frohman, Geo. A. Blackford, Jacob J. Danch, Eugene Ackley and William F. Ross.

The Mead-Morrison Mfg. Co. has been organized at Portland, Me., with a capital of $500,000 to manufacture machinery. The president is Willard S. Martin, of Manchester, N. H., and the treasurer John G. Morrison, of Cambridge, Mass. The directors include Eugene N. Foss and Arthur P. French, of Boston.

The Pugh Foundry Co., Kansas City, Mo., has been incorporated with a capital of $10,000, all paid, to manufacture castings.

Fires and Accidents:—

For the fourth time in four months there was a fire, March 27, at the plant of the Highland Foundry, Roxbury, Mass. As in the previous fires, the origin is a mystery, but it is believed to be incendiary. The fire was confined to a 3-story brick building occupied as a store-room. The damage is estimated at $2,000, fully covered by insurance.

The plant of William Boulden, manufacturer of plain and ornamental iron work, Chester, Pa., was saved from destruction by fire a few days ago in an unusual manner. The crew of a passing locomotive, seeing the flames coming from the

plant, stopped and put out the fire with water from the engine tender. Practially no damage was done.

Fire broke out March 29 in the engine and stock room of the Bromwell Brush & Wire Goods Co., Cincinnati, in its plant at the State prison, Jackson, Mich. The building was destroyed with its engines and a quantity of stock.

Fire in the plant of the Challenge Wind Mill Co., Batavia, Ill., March 26, caused a loss of $22,000, partly covered by insurance. The heat of the flames damaged the machinery beyond repair and destroyed considerable material on hand.

The Pittsburg and Valley Districts:—

The Warwood Tool Co., of Wheeling, W. Va., is having plans prepared for the erection of an entirely new plant, on a large site secured about 10 miles from Wheeling. This company manufactures all kinds of mining tools and the plant will be devoted entirely to this work and the manufacture of lighter tools and equipment. Victor Beutner, of Pittsburg, is the consulting engineer. A large amount of new machinery will be purchased consisting of machine tools, hammers, etc.

The United States Portland Cement Co., of Connellsville, Pa., has secured 62 acres of cement rock near Connellsville, Pa., and intends erecting a large cement plant on the property. The company is to be capitalized at $200,000 and in addition will issue bonds. The initial capacity is to be 1,000 barrels a day. Interested in the company are Robert Garland, Henry Shenk and others of Pittsburg. A proposition has been made to the board of trade of Connellsville to have the citizens of that place take $25,000 of the total bond issue which will bear interest at 6 percent and a bonus of $25,000 of the common stock will also be given.

The Orient Coke Co., of Pittsburg, of which Julian Kennedy is president, has sold to the Farmers' Deposit National Bank its entire bond issue of $700,000 first mortgage 5 percent 20-year bonds and these are being offered for sale by the latter. The company owns 1,151 acres of coking coal in the lower Connellsville region and has designed a coke plant of 500 ovens of which 300 are now under erection. As soon as these are completed work will be commenced on an additional 150 ovens. The company is capitalized under the laws of the State of Pennsylvania at $1,400,000.

The general offices of the Fayette Mfg. Co., whose works, docks and warehouses are located on the Delaware river, Chester, Pa., have been removed to the 18th floor of the Farmers' Bank building, Pittsburg, where the offices of the Harbison-Walker Refractories Co. are located. E. M. Allen, president of the Fayette company, in addition to these duties, will assume the managership of the magnesite and chrome department of the Harbison-Walker Refractories Co. This change went into effect on April 1.

The general offices of the Andrews & Hitchcock Iron Co. have been removed from Youngstown to Hubbard, O., where the company's two furnaces are located.

The new angle mill at the North works of the Carnegie Steel Co., Sharon, Pa., together with the blooming mill, will be placed in operation within a few days. When the plant was shut down last August, the new angle mill had just been completed and tests had been made. Orders have been issued to get this department in readiness for early operation, and it is probable that the open-hearth department will resume early in May. In the meantime raw material will be switched from the South Sharon works. Orders have been issued for the erection of a new heating furnace at this plant at an early date. W. S. Lewis, manager of the South Sharon works, will also have this plant under his management. A superintendent to succeed W. E. Porter has not yet been named.

The Youngstown Bronze Co., Youngstown, O., has increased its capital stock from $25,000 to $50,000. G. S. Jones is president; J. W. Long, vice president; and W. H. McMillin, secretary and treasurer. No extensions are contemplated for the present.

During the month of March, Furnace No. 1, of the South Sharon plant of the Carnegie Steel Co., produced 16,385 tons of iron, which is a phenomenal record for a furnace whose rated capacity is 550 tons. The furnace broke all previous records for 24 hours by producing 638 tons in one day in March. The best previous record was 636.

The molders employed in the foundries in the Sharon, Pa., district whose wages were reduced 5 percent several months ago, have had the reduction restored, beginning April 1.

The Greensburg Wheel & Supply Co., Greensburg, Pa., has been incorporated with $25,000 capital for the purpose of operating a wheel foundry, to manufacture wheels and castings for mine cars. The buildings formerly owned by the Penn Valve & Fitting Co. have been purchased and will be fitted up for foundry purposes. George S. Rumbaugh, J. R. Hayden, W. F. Hayden, M. R. Wiley, J. F. Naley, are the incorporators.

The annual meeting of the Riverside Bridge Co., of Wheeling, W. Va., was held last week and officers for the ensuing year elected as follows: M. E. Whitaker, president; Henry Schmulbach, vice president; F. J. Park, secretary; C. F. Dickinson, general manager. It was reported that the company has under construction four bridges for the Queen & Crescent railroad and two bridges at Seattle, Washington, together with a large amount of other structural work. As soon as the recent fire loss is adjusted extensive improvements will be undertaken. A fire-proof building to contain the machine shop will be built. The company will also install its own engineering department, and this work will be done in Pittsburg.

The Pittsburg office of the S. Obermayer Co. has received and order for the entire foundry equipment of the new plant of Barnard & Davis, Warren, Pa. The foundry is to have an output of 15 tons a day. The Pittsburg office of this company reports a great improvement in trade and anticipates a still further increase with the resumption of additional foundry capacity throughout the Pittsburg district.

The Rich Hill Coke Co., Uniontown, Pa., has fired its coke oven plant, consisting of 56 ovens located at Rich Hill, in the upper Connellsville region.

The corporate name of the West Leechburg Steel & Tin Plate Co., of West Leechburg, Pa., with headquarters in the Farmers' Bank building, Pittsburg, has been changed to the West Leechburg Steel Co. The product of the company consists of hot and cold rolled strip steel, for stamping, blanking and drawing.

The Pittsburg Valve, Foundry & Construction Co., Pittsburg, whose machine shop was destroyed by fire last week, reports that its iron and brass foundries, warehouses containing finished goods and pipe fitting department are uninjured, and that its business will only be crippled temporarily to a small extent. Unfinished orders will be filled without serious delay while new orders will receive the same prompt attention as before the fire. A contract has already been awarded for the erection of a new machine shop to replace the destroyed department and work will be hurried as fast as possible.

New Construction:—

In addition to other new construction recently noted, the Midvale Steel Co., Nicetown, Philadelphia, is preparing to erect a tempering plant which will include a main biulding, 504 x 69 feet; a furnace shed, 432 x 68 feet; a gas house, 378 x 32 feet. Bids on the work will be received April 8. Work will be begun in a few days on the open-hearth building, 231 x 188 feet.

Gus Gille, Joplin, Mo., has started the erection of a machine shop and foundry at Yellville, Ark. About $25,000 will be expended.

The Morning Star Mfg. Co., Napoleon, O., is rebuilding its plant which was destroyed by fire several months ago. The new plant will be built of brick and structural steel. The equipment has been purchased.

The Schneider & Trenkamp Co., Cleveland, O., whose japanning department was recently destroyed by fire, has let the contract for a separate building for its japanning ovens. It is not true, as reported, that the company will build a foundry.

A large crane shop is to be erected at the yards of the William Cramp & Sons Ship & Engine Building Co., at Beach and Ball streets, Philadelphia. The building will be of corrugated iron, 42 x 319 ft.

The Champion Steel Range Co., Cleveland, manufacturer of steel ranges, contemplates erecting a new plant in the very near future. The present officers and directors of the com-

pany are: C. H. Miller, president and general manager; Frank P. Wood, vice president; John A. Herbst, secretary and treasurer, and C. H. Miller Jr. and Frank S. Alber, directors.

The Emerson Steam Pump Co., Washington, D. C., is enlarging its plant for the purpose of building its new double-cylinder vacuum pump. Additional machinery required has been purchased.

The Miners' Foundry & Machine Mfg. Co., El Paso, Texas, has purchased a site 800 by 200 feet, on which will be erected a manufacturing plant.

The Missouri Pacific railway has decided to locate its new shops, to cost about $1,000,000, at Sedalia, Mo. The shops will consist of ten separate buildings to be built of iron and steel frames, and will cover about eleven acres of ground. When finished they will employ between 1,600 and 2,000 en. It is expected that a large proportion of the engines used on the system will be constructed in the locomotive department. One of the largest buildings will be a foundry.

The King Lubricating & Brass Supply Co., recently incorporated, is erecting a plant at Steubenville, O., and will manufacture the King lubricator and fourteen other specialties.

Schwarzschild & Sulzberger will build a cold storage warehouse at the Union Stock Yards, Chicago, eight stories, 106 x 175 ft., of brick and heavy mill construction, at a cost of $150,000. The company will require cast iron, steel beams, 1¼-inch pipe for cooling, iron stairways, elevators, motors, iron tanks, iron doors, etc.

H. E. Kimball, Oklahoma City, Okla., is rebuilding the foundry recently burned at a loss of $5,000. The new building will be of stone, two stories, 40 x 60 ft.

Bartlett, Hayward & Co., Baltimore, will improve their iron works plant by the erection of an additional building 26 x 45 ft., two stories, of brick and iron; estimated cost, $3,500.

The Scott & Oliver Mfg. Co., Knoxville, Tenn., will have, when its present plans are carried out, a machine shop which, it is stated, will be the largest in the South. A contract has been let for a 400-ft. steel structure to the American Bridge Co. The long building which was formerly used by the Southern Car Co. is to be used and besides a large warehouse will be constructed. All this is in addition to the Scott Car Co. plant already established and in operation.

General Industrial Notes:—

The Alliance, O., plant of the American Steel Foundries, which were shut down indefinitely about two months ago, resumed operation April 1.

The property of the West Virginia Steel Co., Wheeling, W. Va., recently sold to Charles H. Copp, has been transferred by him to the Baltimore & Ohio railroad company. It is expected that the railroad company will use the property for switching and other purposes.

The Hyle Steel Tool Co., Syracuse, N. Y., will begin operating its new plant this week. Machinery has been installed.

The Board of Commerce, Detroit, Mich., has contracted with the American Arithmometer Co., St. Louis, manufacturer of adding machines, to move its plant to Detroit.

The Southern Stove Works, Richmond, Va., have the largest and most complete sheet iron department in the South. It is equipped with the latest modern machinery. The output of the works consists of cast iron cook stoves, ranges and heaters, air tight wood heaters, latest improved smokeless oil heaters, and the wickless blue flame oil cook stove which has met with marked success.

The Tilghman-Brooksbank Sand Blast Co., Philadelphia, recently incorporated, was formed for the sale of all sand blast machinery and supplies manufactured by B. C. & R. A. Tilghman, Philadelphia. It is not the intention to build.

The Columbiana Boiler Co., Columbiana, O., whose plant has been idle for a year, will resume operations. About 75 men will be employed and the plant will be operated as an open shop.

Guy Simmons, president of the Independent Machine Co., Columbus, O., has resigned, and the company has been reorganized as the Koenig Claw-Bar Co. with Henry Koenig as president. The company manufactures the Koenig claw-bar.

The Brylgon Foundry Co., Reading, Pa., expects to have its new plant at Newcastle, Del., ready for occupancy in May. The present output will be tripled.

The board of trade of Connellsville, Pa., has received notice from the Fischer Foundry & Machine Co., of Pittsburg, that the company has decided not to move its plant to Connellsville. The city offered a cash bonus of $25,000, but the company could not obtain a suitable site.

M. A. Bentley, of Reform, Ala., will remove his machine plant to Columbus, Miss., and will probably add a department for manufacturing a cotton planter.

A reorganization of the Louisville Bolt & Iron Co., Louisville, Ky., whose plant has been idle for some time, is contemplated.

The Colburn Machine Tool Co., Franklin, Pa., has received a number of orders for machine tools for British and Continental European markets.

The Power Specialty Co., of Buffalo, which manufactures attachments for boilers, is moving its plant to Detroit. It is expected the company will begin operations in Detroit about April 18.

The Francis & Nygren Foundry Co., Chicago, expects to move into its new plant on Filmore street, near Rockwell, this month. The plant consists of a foundry 100 x 140 ft. and separate buildings for office and storage of patterns. The company makes a specialty of castings for ice machines.

The partly dismantled plant of the McKenna Steel Co., West Armourdale, Kan., which has been idle three years, is to be reopened in about three weeks. It will employ about 200 men. The plant is now being overhauled and repairs will be made at a cost of about $10,000. The company will reroll heavy railway rails.

The McCloskey Wire Fence & Construction Co., Toledo, O., has purchased the entire business of the McCloskey Wire Fence Co., Ltd., Detroit, Mich., and Windsor, Ont. The company will remove the Detroit plant to Toledo. The McCloskey Wire Fence Co., which has been operated in Toledo for the past three years, will be part of the new concern. The company will make a specialty of railroad fencing.

A large force of workmen is now repairing the furnaces of the Sheffield Coal & Iron Co., at Sheffield, Ala. Furnace No. 3 is being relined. It is expected that the furnaces will be in blast within thirty days.

The Black-Clawson Co., of Hamilton, O., is about to make a shipment of 35 carloads of machinery to be installed in British paper mills.

The Colt's Arms Co., Hartford, Conn., has secured the exclusive rights to manufacture in the United States the Vickers-Maxim automatic machine guns, heretofore manufactured exclusively by Vickers' Sons & Maxim, Ltd., of London.

The Quintard Iron Works Co., New York, recently incorporated, will take over the business of the Quintard Iron Works, heretofore owned and operated by N. F. Palmer.

The steamer Augustus B. Wolvin, which is 560 feet long, 56 feet beam and 32 feet depth of hold, will be launched at the Lorain, O., yard of the American Ship Building Co. on Saturday, April 9. The Wolvin is spoken of as the largest exclusively freight vessel in the world. There are 17 larger vessels in the world than the Wolvin but they are ocean liners and carry passengers as well as freight. The new vessel will carry between 10,000 and 11,000 tons of ore and 300 tons of fuel on 18 feet draught. It has 33 hatches and with modern machinery can be unloaded in six hours.

Thos. H. Dallett Co., of Philadelphia, announces that recent court decisions on alleged infringements of pneumatic tool patents do not apply to the Dallett tools, which are made under the company's own patents. The plug drills and surfacing machines as well as riveters and clippers of the Thos. H. Dallett Co. embody features which the company says are fully protected by patents.

The East Side Vending Machine Co., Toledo, O., now has its plant in operation. It is manufacturing penny vending machines, also other novelties. The materials used are iron, steel and brass.